A FRAMEWORK FOR THE IMPROVED COMPETITIVENESS OF RESOURCE POOR FARMERS

by

JAN-WILLEM BOONZAAIER

STUDY LEADER: Mr Konrad von Leipzig

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DECLARATION

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ABSTRACT

South Africa has a two-fold agricultural sector consisting of large-scale, industrialised, commercial farmers, as well as small-scale, resource poor subsistence farmers. One of the aspirations of the post-1994 South African Government is to rectify the imbalances in South African agriculture, where less than 20% of the farmers produce more than 80 % of total national agricultural products. In an attempt to improve supply from previously disadvantaged farmers, a land redistribution programme was launched with the goal of transferring 30% of total agricultural land to black farmers by 2014.

However, farmers that are beneficiaries of the land transformation and redistribution programme often struggle to sustain the previous levels of productivity of the land. This is due to inexperience in macro-agriculture as well as a lack of resources. In such cases the beneficiaries revert back to subsistence type farming on previously productive and successful commercial farms. This phenomenon can have a devastating effect on the country's food security, Gross Domestic Product, unemployment rates and the farmer's prosperity and development opportunities. By reverting to small-scale farming, access to formal marketing chains is also restricted because of the economies of scales required to sustain a competitive supply to these markets. Urgent strategies are therefore required to improve the competitiveness of farmers who farm on a small scale due to restricted resources and inexperience. In this regard two proven theories to analyse industries for improved competitiveness exist, namely *value chain analysis* and c*lustering.* Both are investigated in this study in order to determine their suitability for application in the emerging farming sector of South Africa.

Value chain analysis has been widely applied to production and manufacturing industries (including agricultural production and agri-food manufacturing) to scrutinise production processes. Valuable insight into an industry's strong and weak points can be gained by studying various factors. These include the inputs required for the manufacturing of the final product, the steps or processes required in the chain of events, the value added in each step, the contributors in the chain, as well as the linkages between the contributors. Knowledge is also gained regarding chain and process optimisation potential for improved competitiveness.

The c*lustering* of small firms to improve their ability to compete in formal markets has received a significant amount of academic interest over the past 100 years. In this regard it is important to determine the factors that influence competitiveness, and to develop strategies to improve the potential of small-scale manufacturing firms to compete with larger scale enterprises. The clustering or grouping of small firms to co-operate with each other and to compete against larger firms – as opposed to competing against each other – has resulted in improved competitiveness for many small firms across the world.

A number of common key success factors for improving the competitiveness of small-scale, resource poor farmers are identified in this study through the investigation of a host of case studies. The results from these case studies also provide adequate evidence that the analysis and upgrading of value chains, as well as the promotion of collective action by small farmers, are key components for improving competitiveness and market access.

This study focuses on the development of a framework to guide the development of strategies for improving competitiveness amongst small-scale, resource poor farming industries, including a *production cost analysis sheet* to calculate the competitiveness of farmers in this sub-sector. The Framework is also evaluated for its functionality by looking at the implementation thereof amongst a group of emerging farmers in the Western Cape.

OPSOMMING

Suid-Afrika het ’n tweevoudige landbou sektor wat bestaan uit grootskaalse, kommersiële boere, asook kleinskaalse, hulpbron-arm bestaansboere. Een van die aspirasies van die na-1994 Suid-Afrikaanse Regering is om die wanbalanse in Suid-Afrikaanse landbou uit te stryk, waar minder as 20% van die boere verantwoordelik is vir meer as 80% van die totale nasionale landbou produksie. In ’n poging om die verskaffing van landbouprodukte deur voorheen benadeelde boere te verbeter, is ’n transformasie en herverdelingsveldtog van stapel gestuur met die doel om 30% van alle landbougrond in Suid-Afrika teen 2014 na swart boere oor te dra.

Boere wat begunstigdes in die transformasie en herverdelingsveldtog is, is as gevolg van gebrekkige ervaring in makro-landbouproduksie en ‘n gebrek aan hulpbronne meestal nie opgewasse om die produktiwiteit van die plase te laat voortleef nie. Die gevolg is dat hierdie boere nie op kommersiële beginsels boer nie, en eerder terugkeer na bestaansboerdery-praktyke. Hierdie verskynsel het uiteindelik ’n nadelige uitwerking op die land se voedsel-sekuriteit, Bruto Binnelandse Produk, werkloosheidsyfer asook die welvaart en ontwikkelinggeleenthede van die boere self. Deur terug te keer na bestaansboerdery-praktyke verminder die boer ook sy kanse om formele markte te penetreer, aangesien ekonomieë van skaal benodig word om hierdie markte kompeterend en volhoubaar te bedien. Strategieë word dus dringend benodig om die mededingenheid van boere wat op ’n klein skaal te produseer te verbeter, en sodoende die huidige omstandighede en kompeterendheid van Suid-Afrikaanse landbou te verbeter. In hierdie verband bestaan daar twee bewese teorieë, naamlik w*aardekettinganalise en groeperings,* om industrieë vir verbeterde kompeterendheid te analiseer. Beide word in hierdie studie ondersoek om die moontlike toepaslikheid van hul implementering binne die opkomende landbousektor van Suid-Afrika te bepaal.

W*aardekettinganalise* is al in menigte produksie- en vervaardingingsindustrieë toegepas (insluitende die industrieë van landbouproduksie en die vervaardiging van landbou-voedsel produkte) om die produksieprosesse te optimeer. Waardevolle inligting ten opsigte van verbeterde kompeterendheid kan verkry word deur verskeie faktore te bestudeer. Dit sluit die insette wat benodig word in die vervaardigingsproses, die stappe

van vervaardiging, waardetoevoeging per stap, die betrokkenheid van rolspelers asook die wisselwerking tussen die verskillende rolspelers in. Sterk en swak punte van 'n industrie, asook die potensiaal vir ketting- en prosesoptimering word ook uitgewys.

Die g*roepering* van klein firmas – om sodoende hul vermoëns om binne formele markte te kompeteer te verbeter – het ’n beduidende hoeveelheid akademiese belangstelling oor die afgelope 100 jaar gelok. Die doel van die meerderheid van hierdie studies was om te probeer vasstel watter faktore kompeterendheid beïnvloed, en om strategieë te ontwikkel wat die potensiaal van klein firmas om met groter firmas te kompeteer sal verbeter. Die groepering van klein firmas om saam te werk en teen groot firmas te kompeteer, eerder as teen mekaar, het al tot verbeterde kompeterendheid van vele sulke klein firmas reg oor die wêreld gelei.

Deur middel van die bestudering van gevalle-studies van suksesvolle strategieë vir verbeterde kompeterendheid van kleinboere, is daar ’n aantal gemene sleutel suksesfaktore vir ko-operatiewe strategieë geïdentifiseer. Die resultate van die gevalle-studies voorsien ook genoegsame bewys om te aanvaar dat die analisering en opgradering van waardekettings, asook die aanmoediging van samewerkingspraktyke deur kleinboere, beide sleutel komponente is om kompeterendheid en marktoegang vir hierdie boere te verbeter.

Die fokus van hierdie studie is die ontwikkeling van ’n raamwerk as gids vir die ontwikkeling van samewerkings- en groeperingstrategieë vir kleinskaalse, hulpbron-arm boere, insluitende ’n *produksie koste analise spreitabel* om die kompeterendheid van boere in hierdie sub-sektor te bepaal. Die Raamwerk se funksionaliteit en toepaslikheid word ook, as deel van hierdie studie, ge-evalueer deur die implementering daarvan onder ’n groep opkomende boere in die Wes-Kaap.

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CHAPTER ONE

BACKGROUND AND INTRODUCTION

1.1 Introduction

When one scans the latest agricultural-related media of South Africa, it becomes clear that one of the themes currently receiving considerable media attention is *land reformation* and *the transformation of the South African Agricultural Sector* (see for instance almost any recent copy of *Farmers Weekly* magazine). In essence, the agricultural reformation programme consists of the re-distribution of South African agricultural land, to such an extent that land ownership in South Africa more equally correlates with the demographics of the country.

Although agriculture as an economic contributor has diminished over the past few years compared to other sectors in South Africa[1], it is still seen as a substantial contributor to the economic development and welfare of the country (Appel 2007). It has been said that agriculture is one of the sectors that provides the highest number of jobs per rand invested (Van Zyl & Thirtle (Eds) 1988; Kirsten et al. 1998; Van Rooyen 1998a), and that about 25% of the total employment in the country's economy is sustained by agricultural activity (Van Rooyen 1998a). Furthermore, Van Rooyen stated that for every one percent of direct contribution of the agricultural sector towards the aggregate Gross Domestic Product (GDP), a two percent increase in the aggregate GDP is actually activated due to the "interrelatedness and linkages of the agricultural sector with the other sectors of the economy" (Van Rooyen 1998a, p.2). This sector can thus be seen as one of the most prominent and significant contributors to the South African economy and its growth.

[1] The agricultural sector's contribution towards South Africa's GDP has fallen from 4,2% in 1990 to 2,7% in 2004 (World Bank 2008, p.82). This does not necessarily indicate that agricultural activity has "slowed down" – the re-instatement of international trade to and from South Africa in the early 1990's promoted growth in especially the mining and manufacturing industries, which increased these sectors' contribution towards the overall GDP and resulted in agriculture becoming "less prominent" (in terms of contribution).

In a "dualistic economy"[2] such as South Africa's, where economic growth, development and job creation could be seen as high priority items, it could be argued that the main focus should rather be on the development of such a relatively successful employment creation sector, as opposed to the dispute over land ownership. However, Government has made it clear that one of their top priorities in terms of agricultural policies is to develop access for small-scale, subsistence farmers to commercial farming opportunities in order to rectify imbalances in agriculture that could be attributed to South Africa's political history (Meyer, Fényes and Louw, 1998). One of the processes through which this access is promoted is the redistribution of commercial agricultural land from predominantly "previously advantaged" white farmers, to previously disadvantaged black farmers.

As a result a prominent challenge in South African agriculture is to find a balance between addressing the growth of the economy (including increased employment and international competitiveness that could be achieved through the development of the sector), while also addressing residing internal issues such as those mentioned above. Another challenge that arises from the audacious land transformation endeavour of Government (which is discussed in §1.3), is to ensure that, even though the agricultural sector is transformed and the ownership of land is transferred, food security and the ability of farmers to produce food competitively (or affordably) do not suffer.

Although the aim of this study is not to analyse political history, or to do an in-depth study on the land transformation process of South Africa, it inevitable requires a certain degree of probing into the history and politics of South African agriculture. This is needed in order to comprehend the current situation, and to understand how the sector evolved into what it is today. Some of the major events in history that led to a *two-fold agricultural system* (consisting of a "white" farming system on large scale, commercially viable farms, and a "black" farming system on small scale, subsistence[3] farms) are summarised in the following section.

[2] *Developing* in terms of *GDP per capita* growth over the past few years – although South Africa's economy is not comparable to *developed* economies of European and North American countries, the trends in economic indicators (see for instance World Bank 2008) suggest that South Africa is *growing* in economic stature, and can thus be seen as *developing*.

[3] Farming mainly for own consumption

1.2 Abbreviated history of the dualistic South African agricultural sector

There was a time in South Africa when small-scale, *family farming style* agriculture was more competitive than large-scale farming based on hired labour. During the 19th century, African farmers (native to the conditions of the Continent and with generations of agricultural experience) were able to meet the growing demand for agricultural produce during the economic boom of the time, even though they did not make use of hired labour or "first world" technology (Mbongwa, Vink and van Zyl in Thirtle et al. 2000). Not only did African farmers participate in product markets, but some also competed effectively against large-scale settler farmers (van Zyl in Van Zyl & Thirtle (Eds) 1988; Mbongwa, Vink and van Zyl in Thirtle et al. 2000). African farmers of that time were successful, and small-scale *family farming* was competitive and more efficient than large-scale farms (Van Zyl & Thirtle (Eds) 1988; Sartorius & Kirsten 2004).

From the late 19th century, a few factors contributed towards the decline of competitive small-scale agriculture in South Africa. The discovery of diamonds and gold in the 1860's, for instance, had a big impact on South African agriculture (Terblanche in Kirsten et al. 1998). During this time of industrialisation, large-scale farms across the world struggled to be competitive with the viable and efficient small-scale, "family farming" model. The technology of the time was simple, and land was abundant, therefore labour and the management of labourers were the key success factors – larger farms required more workers, including a management and supervision component that was not needed on smaller farms (Terblanche in Kirsten et al. 1998). The high labour requirements of the thriving mining and manufacturing industries of the time resulted in a shortage of workers for the larger farms, while the African farmers' family farming "model" required little hired labour (van Zyl in Van Zyl & Thirtle (Eds) 1988; Mbongwa, Vink and van Zyl in Thirtle et al. 2000).

The South African Government of the time had to intervene to ensure that both the growing industrial economy, as well as the farming economy would continue to grow and be successful. A detailed discussion regarding the interventions, political events and acts that followed from these events up until 1994 is not important in the context of this study. However, these events can be summarised from literature as *an intervention to improve the viability of large-scale, white farms, and to provide inexpensive black labour to the industrial activities in the urban areas* (J. Van Zyl & Vink 1998; Thirtle et al. 2000). Black farmers were

thus "prevented" from taking part in large-scale agriculture, thus forcing them to find alternative employment. This was done to ensure that the growing industrial sector's labour requirements were satisfied. Intervention from Government went so far that, by the end of the 1980's, nearly 90% of the agricultural land supported about 5,3 million people, while the remaining agricultural land in the then homelands of South Africa supported over 13 million people (Van Zyl & Thirtle (Eds) 1988; Thirtle et al. 2000)[4]. The once very successful African family farming sector had been "eliminated", and African peasants had been transformed into wage workers on large farms, in mines and in secondary industries (J. Van Zyl & Vink 1998).

At the time of re-admission of indigenous farmers into the South African economy after the 1994 elections, a few generations had passed, and indigenous farmers were suddenly almost 100 years "behind" the rest of the agricultural movement in South Africa. During this time in isolation, the impact of technology on agricultural competitiveness had increased significantly, and the South African fresh produce marketing system had been privatised and "formalised" (Sartorius & Kirsten 2007). To increase profitability, agricultural supply chains became shorter, and big buyers now contracted farmers directly for supplying them with produce, rather than opting to purchase fruit and vegetable produce from the traditional markets (Sartorius & Kirsten 2007; Key & Runsten 1999). These changes in the agricultural sector, which can be viewed as the *modernisation* of the sector, together with the globalisation of the world economy, increased the degree of difficulty associated with being competitive in agriculture.

1.3 The transformation of South African Agriculture

> *"The dilemma for the South African Government is, despite an international trend towards fewer, larger farms, there is an urgent need to transform the agricultural sector by way of the inclusion of smallholders in the commercial farm sector"* (Sartorius & Kirsten 2004, p.88).

The South African Government has committed itself towards transferring the ownership of agricultural land to represent the demographics of the country. The adopted target was to

[4] More recent figures indicate that currently about 2% of all farmers in South Africa farm on 87% of the arable land in the country, producing more than 95% of the marketed output. The rest of the about 3 million farmers are small-scale farmers farming on 13% of the land, mostly to meet their family's subsistence needs, as opposed to farming primarily for income. (National Department of Agriculture 2001)

transfer 30% of land owned by previously “advantaged” farmers to previously “disadvantaged” farmers (AgriBEE Steering Committee 2005; Biénabe & H. Vermeulen 2007; News24 "Land reform threatens farming" 2008).

One of the major challenges in the land transformation attempt is the fact that many farmers that are beneficiaries of the land restitution programme are inexperienced in terms of commercial farming. Previously these farmers were mostly involved in subsistence farming (producing for own consumption), and as a result any overproduction was sold on an informal basis to friends and neighbours. One of the aims of the agricultural transformation process is to develop these previously disadvantaged farmers into commercial farmers in their own right. With no previous experience in large-scale farming or dealing with “formal markets”, it is to be expected that these farmers will struggle at first – a scenario that will inevitably result in a decline in productivity and quality of produce in comparison to that which was previously cultivated on the farm. The challenge remains to maintain the farm’s productivity and profitability, even though the farm has been transferred to farmers with a traditional *subsistence* or *family farming system* background.

The situation South African agriculture found itself in after the establishment of democracy in 1994 was unique – the agricultural sector consisted of large-scale commercial farms (mostly operated by white people) and small subsistence-type farms. This was in contrast with the situation in many other countries in the world, where one would find a range of farm sizes all farmed commercially (Kirsten & J. Van Zyl 1998). Groenewald’s (1998) view on the current transformation situation leads to a proposed change in focus, which supports Kirsten & Van Zyl’s observation that both small and large-scale farms could be commercial in nature. According to Groenewald, the transformation of the agricultural sector should not only imply the transfer of production areas from white to black farmers, but should also aim to improve those who practise subsistence agriculture, thereby placing them in a position to modernise and commercialise their farms in order to make a sustainable living from these farms.

1.4 The emerging farming sector of South Africa

As discussed in the introductory sections of this chapter, South Africa has a history of a two-fold agricultural system, consisting of a large-scale, *industrialised* and *commercialised* sector,

and a *small-scale*, mostly *subsistence* sector. This divide was mainly caused by governmental policy, which restricted black farmers from partaking in large-scale commercial agriculture in order to promote growth in the industrial and mining sector of South Africa.

With this abbreviated history as background, this section will provide more detail on the current situation of emerging farmers, including the challenges these farmers face in the South African economy.

1.4.1 Classification and definition of emerging farmers

The South African concept of *small-scale farmers* is often viewed in a negative light, thereby creating misguided impressions. The term is often associated with *backward*, *non-productive*, *non-commercial*, *subsistence agriculture*, which comes mainly from policies, implemented by the previous Government, that restricted assistance to farmers with "small farms". Although the reference made to small farmers usually implies black farmers that were previously living or farming in the South African Homelands, a large percentage of white South African farmers that are referred to as commercial farmers, are farming successfully and profitably on "small farms" of less than 10 ha (Kirsten & J. Van Zyl 1998). The physical size of farms should therefore not be seen as the definitive factor in the classification of farmers.

These days, small-scale black farmers are often referred to as *emerging farmers*, as they are in the process of emerging from subsistence farming to commercial farming[5] (farming mainly for income). Over and above the inexperience of these farmers, most of them also do not have access to physical resources such as infrastructure, equipment and the capital required to initiate an industrialised, commercial agricultural business – hence the other commonly used term: *resource poor farmers*. The fact that these farmers are inexperienced, still developing and lacking resources, means that, realistically, they can only farm on a small scale.

[5] For a formal definition of the different type of farmers in South Africa, please refer to § 2.2

In order to gain a better understanding and a clearer definition of small farming in a South African context, Kirsten & Van Zyl's (1998) work on this topic serves as a good starting point. These scholars proposed the following definition for small farmers in modern South Africa:

> *A small farmer is one whose scale of operation is too small to attract the provision of services he/she needs to be able to significantly increase his/her productivity.* (p 564)

Although the above may not be an exhaustive definition, it is sufficient for the purposes of this study – the focus being on small farmers, where these farmers can be seen as:

- inexperienced in commercial farming and commercial production methods (thus inexperienced in farming with the aim to supply "formal" markets such as supermarkets on a regular basis);

- resource poor in terms of infrastructure and equipment, transport, arable land, production capital and other factors – a situation that prevents the farmer from expanding or increasing production and productivity.

The terms "small farmers", "small-scale farmers", "resource poor farmers", "historically disadvantaged communities", "emerging farmers", "subsistence farmers", "small growers" or "smallholder farmers" are commonly used to refer to these farmers, as opposed to "commercial farmers" or "large-scale farmers" (as per Biénabe & H. Vermeulen 2007, p.5). The terms "small farmers" and "resource poor farmers" will be used in this study to refer to the "emerging farmer sub-sector" of South African agriculture.

1.4.2 Challenges and constraints of small farmers

Although both emerging and commercial farmers compete in the same industry in South Africa, there are obvious differences between these two components. Despite the normal challenges associated with agriculture (including scarcity of natural resources in South Africa, increasingly high input costs, the unpredictability of nature and markets, to name a few), small

and resource poor farmers face additional challenges not experienced by well established, large-scale farming operations.

Analysing the so-called “marketing constraints” faced by resource poor farmers in South Africa, Louw (in Nortier 2007) recorded the following as the main challenges preventing these farmers from participating in formal markets:

- Cash flow constraints and a lack of access to credit;
- Land tenure problems (amongst others the difficulty for benenficiaries of the land redistribution programme to gain ownership of the land asset);
- The lack of appropriate technology and products for combating pests and diseases;
- The lack of commercial production experience;
- The lack of access to efficient equipment;
- The lack of access to better yielding plant varieties.

One of the most prominent constraints resource poor farmers in South Africa face is supplying the formal markets with the volumes required. In this regard supermarkets would rather procure from bigger suppliers who can supply according to their order volumes and timeframes (P. Van Zyl 2007; Biénabe & H. Vermeulen 2007; Berdegué et al. 2008). Procurement from a big number of small farmers, rather than from a few bigger farmers, increases transaction costs for buyers, which in turn inhibits the relationship between buyers and small farmers (Sartorius & Kirsten 2004). However, Berdegué, Biénabe & Peppelenbos (2008) note that in some cases buyers can be forced or persuaded to source from small farmers due to as the following factors:

- Scarcity of products or big suppliers in the immediate surroundings, or distance between distribution centres and market;
- The characteristics of the product from a small supplier (quality of the product supplied up to standard or even superior, for instance niche products such as organic produce);
- The possibility of gaining access to subsidised inputs and technical and financial assistance from the public sector by supporting local small farmers;

- The possibility of gaining political or community goodwill by supporting local small farmers.

The above factors can all be seen as components of a strategy that could address the constraints faced by resource poor farmers, thereby enabling them to access formal markets. This will become more evident at a later stage in this study.

1.4.3 Co-ordination and co-operation of emerging farmers

The traditional strategy for assisting small farmers in growth and development was aimed almost exclusively at the production end of the value chain, aiming to improve yields of subsistence farmers in order to create a surplus that could be sold at markets (Lundy et al. 2004). However, in the modern marketplace, where the balance between supply and demand is becoming more important, such a one-sided approach could backfire because of saturated markets, resulting in farmers not being able to sell their produce at competitive or even realistic prices. These challenges facing farmers are magnified in the small-scale farming sector, where inexperienced farmers with generally low volumes, low yields and low quality of produce must compete in established formal markets. Therefore, in order to create value in a modern agricultural chain (thereby becoming competitive), a broader, *integrated market* or *co-ordinated value chain driven* strategic approach is required that will improve the competitiveness and absorbency potential of small farmers' produce.

There exists potential for improved *efficiency* and *competitiveness* of small agri-food firms through their co-operation within linkages created in structured value chains. In this regard a number of models can be utilised to analyse this potential, and to examine these two factors (co-operation between firms and the development of the value chain). These models are discussed in chapters two and three.

1.4.4 The efficiency and competitiveness of small farms

Literature indicates that, despite the generalisation that "bigger is normally better", small farm systems can be more efficient than large farms (Kirsten et al. 1998; J. Van Zyl & Vink 1998; Sartorius & Kirsten 2004). In many cases, small farmers can produce at more competitive prices than large, industrialised farmers due to factors such as lower land and labour related costs (small farmers often farm "by themselves" or make use of family labour), as well as better management structures. Due to the small size of the farm and the fewer number of employees that have to be managed, one small farmer can, for instance, be the owner, manager and field worker of a small plot (Beijing Conference Issues Paper 4 2008). A further strength that has a positive impact on the cost effectiveness and efficiency of small farmers, revolves around improved motivation levels, where self employed and family workers are generally more motivated than hired labour (Van der Meer 2004). It has even been argued

that, as discussed earlier in this chapter, the only reason why large-scale faming in South Africa has become more efficient than smaller scale farms, is due to the fact that it has been "artificially inflated by decades of colonial and apartheid policy that has created cheap access to subsidies and credit" (Sartorius & Kirsten 2007).

Despite evidence from literature attributing the success of "white South African agriculture" mainly to assistance from government, another phenomenon could be linked to the growth and success of "large scale commercial agriculture", namely *structures* or *networks*. White commercial farmers organised themselves into a number of commodity groups, co-operatives and regional and national organisations. These organisations have been "extremely powerful and successful in securing for their members preferential terms of trade, subsidies and protection from external competition" (CJ van Rooyen, 1998).

Since the founding of the South African Agricultural Union in 1904, farmer unions or co-operations in South Africa have operated as agents for their members in purchasing and selling products, and have been creating economies of scale by grouping farmers. Services such as grading, storage, processing, financial support, extension and insurance were provided to groupings of farmers, all at reduced risk and cost to each individual member (Carney & van Rooyen, 1998). It is interesting to note that all the benefits provided by co-operations mentioned above are shortages, challenges and barriers that developing African farmers are currently facing in succeeding in the South African marketing system.

The concept of *co-operation*, *collective action* or the *grouping* of farmers bear a close resemblance to *clustering*, a concept which has been used successfully as a strategy to improve the competitiveness of small manufacturing firms worldwide (see for instance Porter 1990, Schmitz 1995, McCormick 1999, Nevan & Dröge no date).

On a recent international conference regarding the state of resource poor farmers in retail value chains, it has been said that the close proximity and co-operation (in other words clustering) of agricultural production units, as well as formalised and upgraded supply chains, could improve the chances of small farmers to respond to opportunities and changes in the market (Beijing Conference Issues Paper 4 2008).

These observations led to the question of whether *clustering theory*, together with the concept of the agricultural co-operative and the development of linkages through *improved value chains*, could be possible solutions towards investigating and improving the competitiveness of the small-scale, developing agriculture sector of South Africa.

1.5 Aim, focus and hypothesis of the study

The **aim** of this study is to develop a conceptual framework to analyse small farmer industries and to develop strategies to improve their competitiveness in supplying fresh produce, with the eventual mission of linking these small farmers to formal markets, thereby developing them into successful commercial farmers. The Framework should act as a guide to analyse and measure the competitiveness of farmers, and to develop strategies for potential improved competitiveness.

The **hypothesis** of this study is that **collective action and improved value chain linkages between small farmers can improve the competitiveness of these farmers in supplying agricultural produce to formal markets.**

The **focus** of this study is the improved competitiveness of small-scale cash crop[6] farmers, specifically in the environment of the urban areas of the Western Cape. This narrow focus has been chosen for the purpose of this specific study, and does not necessarily suggest anything regarding the competitiveness of these specific farmers, the environment, market, climate or crops.

1.6 Methodology and outline

The methodology towards verifying the Hypothesis and developing the Framework consists firstly of understanding the horticultural sector of South Africa in which small farmers compete. This understanding will be gained through two investigations – a brief overview of the history

[6] Cash crops include all horticultural produce that could be cultivated and harvested within a short timeframe, generally within 6 to 10 weeks. Cash crops include common vegetables such as carrots, sweet potato, butternuts, etc, but also some commodity products, such as grain. Perennial crops such as deciduous plants (apples, peaches, etc), which normally only start to bear fruit after two or three years, are excluded from this study for the interest of the study's focus. The term "cash" refers to the short timeframe in which the crop can be turned into cash.

of the so-called “two-fold" agriculture system” (namely large-scale, commercial agriculture and small-scale, subsistence-like agriculture) of South Africa, as set out in the **introductory chapter**, and an investigation of the fresh produce value chains of large and small scale farmers in **chapter two**.

The methodologies of several guides and models regarding strategies for improved linkages and the incorporation of resource poor farmers into modern and “formal” market chains, suggest that “value chain mapping” should be the first step in the development of such strategies. **Chapter two** will commence with an investigation into the definition of a value chain and a value chain analysis, followed by a brief overview of some of the guidelines that exist. As part of the introductory background for this study, the chapter will then conclude with an investigation of the sector in terms of the value chain of horticultural production, from primary production up to the the consumption of the final products.

Apart from *value chain analysis* and *mapping* (which are existing tools for the analysis of industries with the intention of improved competitiveness of small firms), various other models exist in the literature. Guidelines and frameworks that were developed for the agricultural sector mostly focus on improved and co-ordinated supply chains, in other words *vertically* focused strategies. Numerous models for improved competitiveness through collaboration (in other words *horizontally* focused strategies) of small firms exist in the literature, although these models mainly focus on the manufacturing sector. However, some correlation can be found between agricultural production and manufacturing. In this regard three horizontally (co-operation and clustering of firms) focused models will be analysed and discussed in **chapter three** to confirm whether these models would be applicable for this particular study.

To determine if and how these models could be incorporated into the Framework, some key success factors for these models are identified in **chapter 3**. In addition, case studies of previously successful implementations of collective action models as strategies are also discussed.

In **chapter four**, the definition of competitiveness and the measurement thereof will be investigated, after which the suitability of different existing models in the context of this study will be examined. A suitable existing model’s methodology will be chosen as the methodology

for the measurement of competitiveness in this study, after which a spreadsheet will be developed as a tool for the measurement of the competitiveness of small farmers, as well as to measure potential improvements in this competitiveness as a result of possible strategies.

In **chapter five** the Framework for improved competitiveness of small farmers – based on the literature study and investigations of the preceding chapters – will be detailed. This chapter can be seen as a discussion of the preliminary conclusions of the study, since it will consist of the culmination of the findings of the preceding chapters. This discussion of the Framework will be followed by an implementation case study thereof in **chapter six.** This will be done for the purpose of evaluation.

The study will be concluded in **chapter seven** with a summary of the findings of the study. This will include results from the "evaluation implementation" of the Framework, recommendations for the further implementation thereof, as well as suggestions towards further studies for the improvement thereof.

CHAPTER TWO

ANALYSIS OF THE EMERGING FARMER INDUSTRY

2.1 Introduction

> *"The essence of formulating competitive strategy is relating a company to its environment. Although the relevant environment is very broad, encompassing social as well as economic forces, the key aspect of the firm's environment is the industry or industries in which it competes. Industry structure has a strong influence in determining the competitive rules of the game as well as the strategies potentially available to the firm."* (Porter 2004, p.3)

In order to develop a strategy for the improved competitiveness of an industry, an understanding of the structure of the industry, including the components, activities and factors that could influence the competitiveness of the industry as a whole, as well as on individual enterprises level, is required. To formulate such a strategy for small farmers, all the activities and role-players that have an influence on the agricultural sector should therefore be identified, after which the focus should shift to those activities that small farmers and other small role-players need to execute more efficiently. One mechanism through which such an understanding of a sector can be gained and an analysis of an industry can be done is by means of a *value chain analysis,* as proposed by Porter (2004).

This chapter commences with a brief discussion on the concepts of value chains and value chain analysis, after which the value chain of the horticultural industry will be described and mapped, including the various activities and linkages that influence the sector. Throughout the chapter, the proper horticultural industry will be the departure point for investigations and discussions, after which the sub-sector of small-scale agriculture will be focused upon.

2.2 The value chain

> *"A value chain includes all the activities that are undertaken in transforming raw materials into a product that is sold and consumed. These include the direct functions of primary production, collection, processing, wholesaling and retailing, as well as the support functions, such as input supply, financial services, transport, packaging and advertising. The terms "value chain" and "supply chain" are often used interchangeably. ..... the term value chain (is used) to reflect the understanding that value is added at each point in the chain. In modern markets careful management of the entire value or supply chain is critical to ensure quality and safety and to maximise efficiency."* (S. Vermeulen et al. 2008, p.1:14)

Any process entails taking a given set of input factors and modifying them into a different set of outputs – value is added to the *inputs* during the process of creating a different *output* or *end-product*. The *transformation process* of taking different raw products from different sources as inputs and adding value to them in order to create a final product through primary production and processing, and then marketing the final product to consumers, is referred to as a supply chain. The collection and organisation of these activities that add value in the process of creating a final product for an end user, was termed the "value chain" by Porter (1998). According to Porter, firms gain a competitive advantage over their rivals by the way in which they organise and perform discrete activities that are part of a value chain.

In reference to the aim of this study, Esterhuizen's (2006) referral to a *supply chain* or v*alue chain focus* for the improvement of competitiveness in South African agriculture should be noted. According to Esterhuizen, linkages between producers, processors, marketers and distributors create the environment in which value is added during each step, while benefits and risks are distributed among participants. These linkages create the opportunity for smaller firms to be competitive within a cluster or within a chain with other chain participants in a co-ordinated manner.

The agricultural sector, and each individual firm within the sector, has a range of forward and backward linkages with other firms and suppliers, all of which contribute towards the final

products and the competitiveness of the sector. These days, the agricultural sector worldwide is increasingly following manufacturing industries in the formation of tightly aligned value chains to improve efficiency and competitiveness (Boehlje et al. 1999). Value chains are therefore an important component in the competitiveness of an industry. The concept of value chains, and the analysis of value chains to formulate strategies for improved competitiveness, are discussed in the following sections.

2.2.1 Activities and components within a value chain

> *"A firm's value chain is an interdependent system or network of activities, connected by linkages."* (Porter 1998, p.41)

Porter conceptualised the value chain as the series of activities that contribute towards a business's service or final product, and through which a competitive advantage is gained over other firms by conceiving of new ways, procedures, technologies or inputs among these activities (Porter 1998). Activities that add value to an enterprise can be divided into primary activities – which are directly involved with creating and delivering a product – and secondary activities – which may increase effectiveness or efficiency in production, although not directly involved with the production process (www.tutor2u.net/business/strategy/value_chain_analysis.htm).

The activities and components of a value chain are illustrated in Figure 2.1, and described in Table 2.1 (as adapted from the tutor2u.net website). The concept of a *value system* (which consists of the value chains of the respective role players within the sector) is illustrated in Figure 2.2.

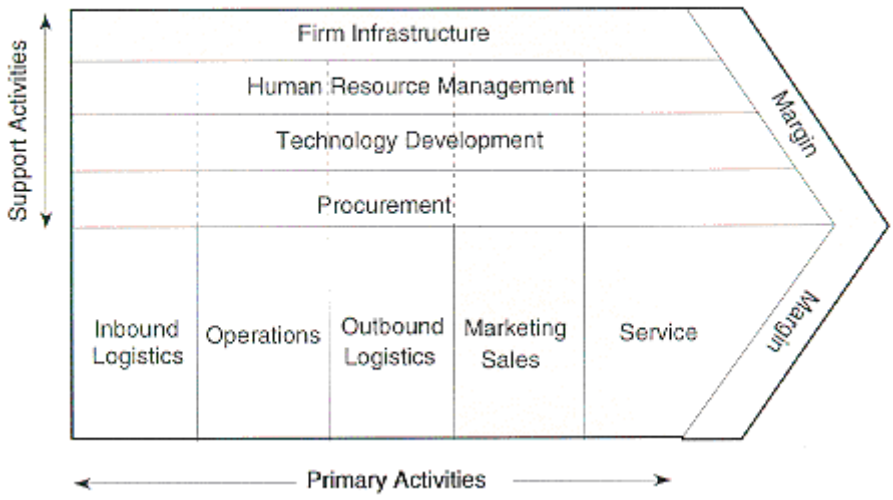


Figure 2.1 Activities and components of a value chain
(Source: Porter 1985)

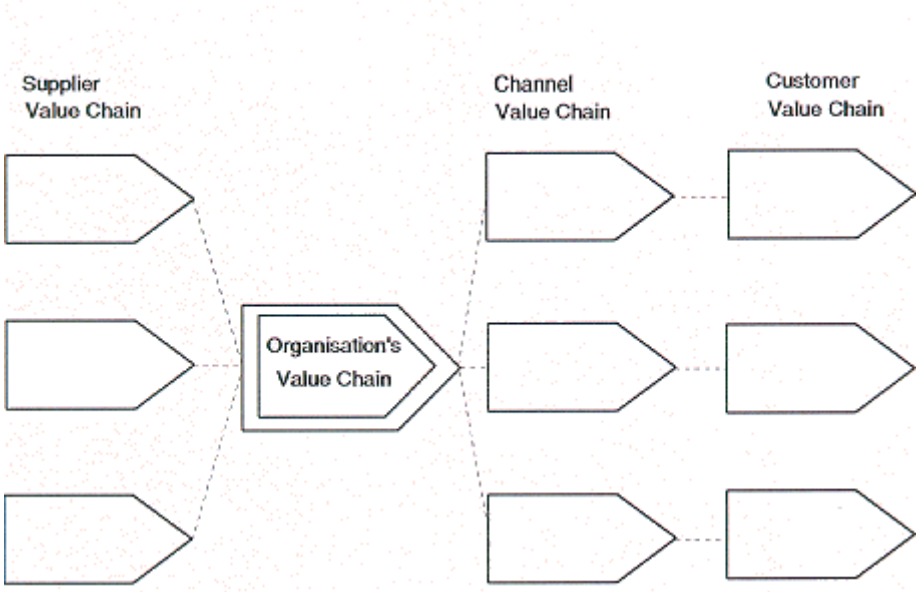


Figure 2.2 A value system
(Source: Porter 1985)

Table 2.1 Primary and secondary activities of a value chain
(adapted from tutor2u.net)

Primary activity	**Description**
Inbound logistics	All activities concerned with receiving and storing externally sourced materials
Operations	The value creating activities - the way in which resource inputs (raw materials) are converted to outputs (final products)
Outbound logistics	All activities associated with getting finished goods and services to buyers
Marketing and sales	Essentially an information activity – activities that inform buyers and consumers about products and services (benefits, use, price etc.)
After-sale service	All activities associated with the process after the product has been sold
Secondary activity	**Description**
Procurement	How raw materials and other inputs used in the value adding process are acquired
Human resource management	Activities concerned with recruiting, developing, motivating and rewarding the workforce of a business
Technology development	Activities concerned with managing information processing and the development and protection of "knowledge" in a business (research and development)
Infrastructure	Concerned with a wide range of support systems and functions such as finance, planning, quality control and general senior management

The competitive advantage created by modern firms often lies in the difference between “traditional” (supply) chains and “modern” (value) chains (Parker, Colero and Bouma 2004). Although these terms are often used interchangeably to describe the chain of processes in an industry (S. Vermeulen et al. 2008), in the case of “value” chains the focus of the participant is on *adding value to the product* in the chain for the benefit of the other participants and consumer (optimising the chain). On the other hand, “supply” chains refer to the transferral of a product through a number of handling agents from point A to point B, with each agent adding its fees for pushing the product forward, until it reaches the end consumer (self optimisation). Other notable differences between these two approaches, as seen by Parker, Colero and Bouma (2004), are summarised in Table 2.2.

Table 2.2 The value that value chains add to supply chains
(Source: Parker et al. 2004)

	Supply Chain	Value Chain
Communication (information sharing)	Little or none	Extensive
Value focus	Cost/price	Value/quality
Product	Commodity	Differentiated product
Relationship	Supply push	Demand pull
Organizational structure	Independent	Interdependent
Philosophy	Self optimization	Chain optimization

Temme (no date) described the purpose and value of value chain analysis as a tool to analyse the competitive situation of a company, and to understand and determine new strategies for improved competitiveness. Schmitz (1995) commented that the study of the clustering of firms and how clusters develop, should ideally be supported by a *value chain analysis* of the industry, since the connections and linkages present (or required) in a cluster could be identified within the flow of materials and value chain. Van der Meer (2004, p 215) added that "co-ordinated supply chains are commercial tools in competitive strategy".

It is therefore clear that *improved supply chains* and *more co-ordinated and integrated linkages in the agri-food sector* have been widely recommended as potential strategies for improving competitiveness, gaining better access to markets and developing resource poor farmers. This is confirmed in the studies of Lundy et al. (2004), Parker, Colero & Bouma (2004), Mundy & Aduke (2005), Taylor (2005) and Vermeulen et al. (2008) – all of these works recommend the mapping and analysing of an agricultural industry through a value chain analysis as a starting point in strategising for improved competitiveness.

2.2.2 The value chain analysis process

The value chain analysis of an industry focuses on the dynamic inter-linkages within a productive sector, especially the way in which firms are integrated (Kaplinsky & Morris 2001). Value chain analysis has been found to be, as Kaplinsky and Morris state, "particularly useful for new producers – including poor producers and poor countries – who are trying to enter global markets in a manner which would provide for sustainable growth" (p 58). In the agricultural sector of South Africa, this drive towards entering global markets is especially true, since the highest level of agricultural production can be reached by securing an international market share. In this market, the requirements are more stringent, but financial returns are higher, and the challenge is to be able to consistently supply this market with the quantities and high qualities that are demanded by the importing (mostly first world) countries.

In an applicable study regarding the suitability of the value chain analysis process (initially developed for industrial products) for application to the agricultural industry, Taylor (2005) examines whether value chain analysis techniques could be used to form the basis of co-operative approaches for development in the agri-food sector. His conclusions are that a value chain analysis methodology to facilitate the procedure of investigating the sector and presenting proposals for improvement, is particularly useful, and should consist of seven stages with the following four outputs or deliverables:

- Developing a current state map (status quo) (Stage one to four);
- Identifying key issues and opportunities (Stage five);
- Developing of future state map or ideal supply chain (Stage six);
- Developing of action plan to progress from current state to future state (Stage seven).

The seven stages as proposed by Taylor are illustrated in Figure 2.3.

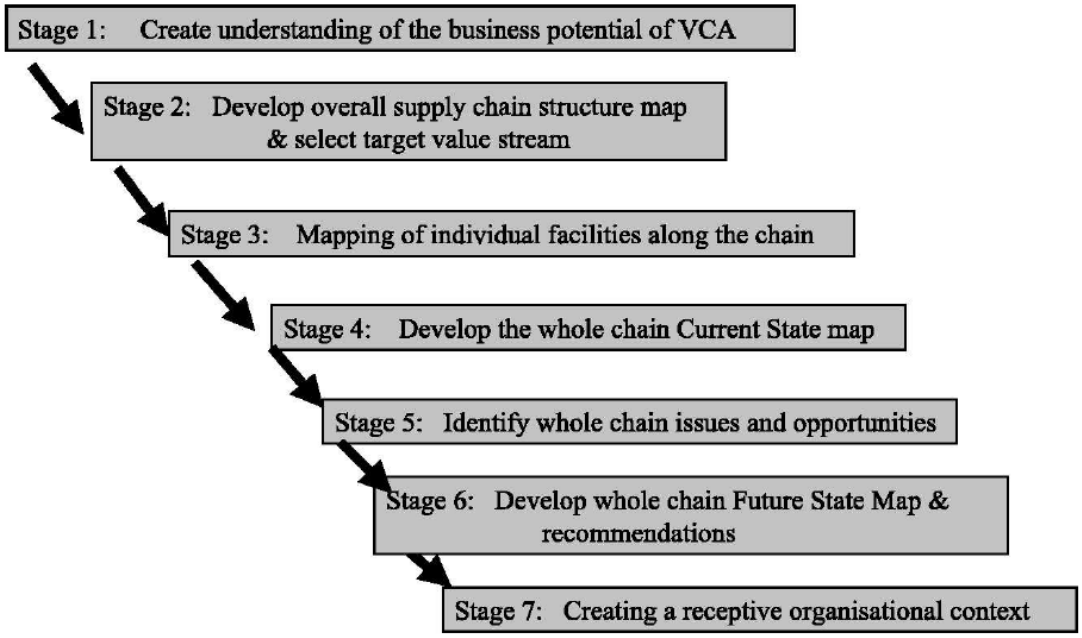


Figure 2.3 Taylor's VCA methodology
(Source: Taylor 2005)

In *Regoverning Markets' Chain wide learning for inclusive agri-food market development framework,* Vermeulen et al. (2008) developed an analytical framework to identify, promote and enhance marketing opportunities for small-scale producers. The methodology is centred around the mapping of the existing value chain, as well as the ideal value chain of an industry in order to identify the main role players, flow of products, money and information in the sector. Figure 2.4 summarises Vermeulen et al's framework, which was developed to guide multi-stakeholder forums and workshops (from every part of the value chain) to understand the chain of events and the actors that could influence the various processes, and to improve linkages between these stakeholders towards improved competitiveness.

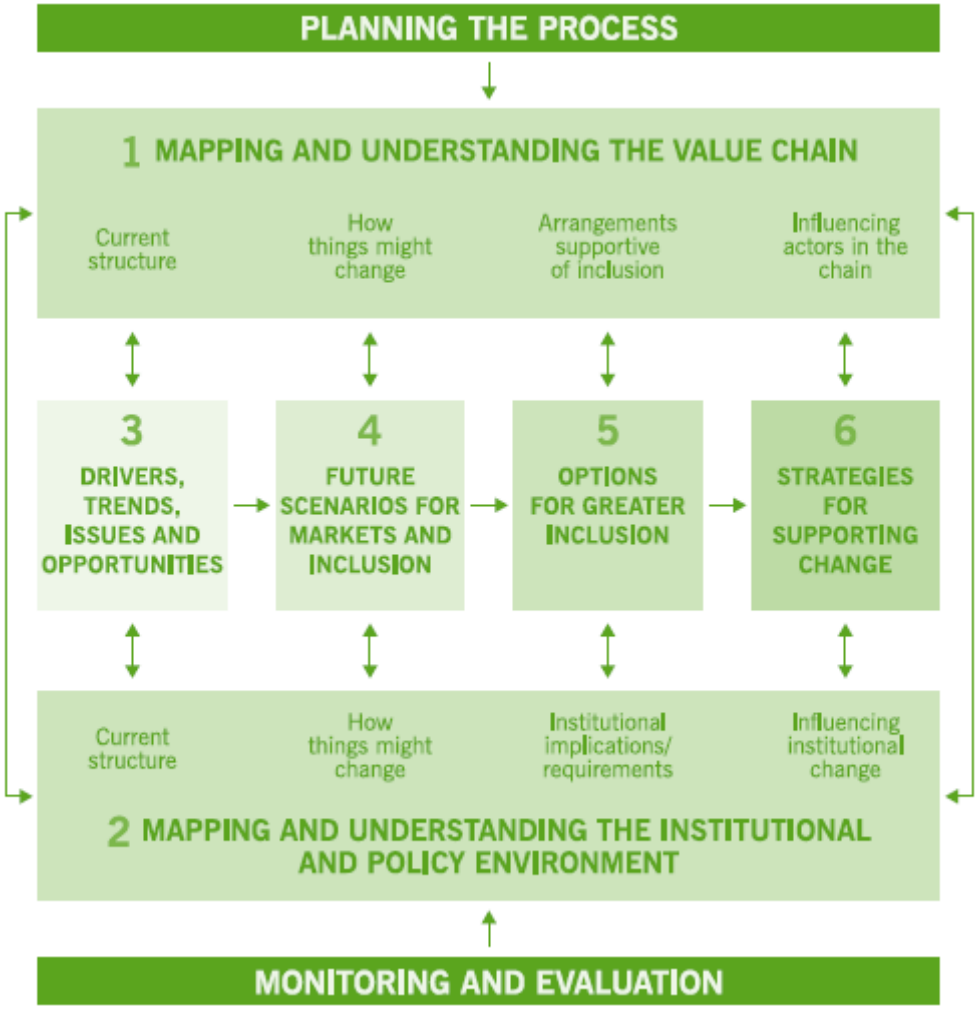


Figure 2.4 Analytical framework for mapping and influencing policies and institutions in dynamic agri-food markets
(Source: S. Vermeulen et al. 2008)

Mundy & Aduke (2005) also proposed a *value chain perspective approach* to strengthen business links between producers, service providers and buyers in the agricultural sector in the *Royal Tropical Institute*, *Faida Market Link Company Ltd* and *International Institute of Rural Reconstruction's Chain empowerment guide for supporting farmers to develop markets.* The Framework is based on practical experiences from implementing organisations working with resource poor farmers in Africa. The Framework focuses on value chain developments to improve the competitiveness of small farmers, with reference to the farmer's involvement with other activities that are part of the chain (such as post-harvest handling and marketing), and their involvement and control in the management of the chain. According to this model, there are four types of farmers, depending on their role and authority within the supply chain:

- Chain actor
- Chain partner
- Chain activity integrator
- Chain (co-)owner

Although their conclusions suggest that there is no ideal position for a farmer (or farmer group) to be located in, the different scenarios are used to understand how small farmers could improve their position within the chain, and how they could increase their control over the chain in order to improve their income potential. Mundy & Aduke's (2005) model implies that farmers could improve their competitiveness and position within the chain by improving on the activities or in the management with which they are involved.

Mundy and Aduke's chain intervention model is built on the mapping of value chains and the assessment and monitoring thereof. The implementation thereof is divided into five phases, which are listed below and illustrated in Figure 2.5:

- Phase I: Chain assessment, mapping, analysing and reviewing;
- Phase II: Building engagement between farmers and other actors;
- Phase III: Chain development by improving processes, products, intra-chain and inter-chain upgrading;
- Phase IV: Chain monitoring and market evaluations;
- Phase V: Learning and innovation to adjust approaches.

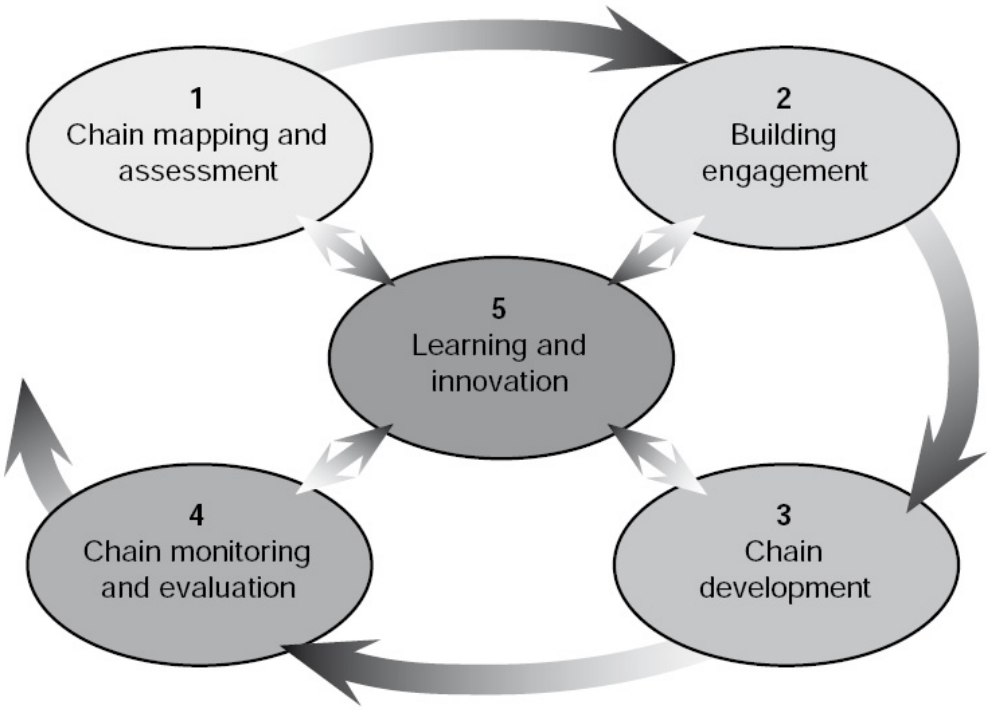


Figure 2.5 Components of chain intervention
(Source: Mundy & Aduke 2005)

Another value chain approach is the Agricultural Food Council of Alberta's *value chain guidebook: a guide for value chain development,* developed by Parker, Colero & Bouma (2004). Their strategy for improved competitiveness for agri-food businesses is a *market-focussed collaboration in the supply chain.* The collaboration implies that different enterprises work together to produce and market products more efficiently. The motivation for the development of a value chain is based on three of the main requirements of modern markets, which are all addressed by the development of a value chain: improved quality, increased system efficiency (in other words lower costs) and differentiated products.

Parker, Colero & Bouma (2004) also confirm that value chains are powerful tools to analyse and improve industries, and that the development of a value chain could bring about numerous rewards, albeit additional potential risks as well. The potential rewards and risks that could be the result of value chain interventions (as identified in their study), are listed in Table 2.3 overleaf.

Table 2.3 The potential rewards and risks of value chain interventions
(adapted from Parker, Colero & Bouma 2004)

Rewards	Risks
• A competitive edge when the chain's products and processes are difficult to duplicate • A unique way to manage risk – buyers are assured of product quality, supply and safety through integrated systems from production to retail. Suppliers are more assured of a market and the benefits of economies of scale • Improved access to markets because of increased volumes and networks • Reduced time to respond to changing customer demands as a result of better communication with other actors and stakeholders that are part of the chain • More rewarding business relationships – collaborative versus adversarial	• Less control as business activities are shared • Longer decision making time since more people are involved • Less flexibility and independence than with individual business – many decisions will be made jointly with partners • Others gaining access to proprietary information or expertise • Time, effort and money required to achieve a well functioning value chain

Parker, Colero & Bouma's (2004) *value chain development approach* consists of the following stages:

- Stage I: Identifying the opportunity by
  - Mapping the supply chain
  - Evaluating the supply chain
  - Outlining the opportunities

- Stage II: Developing a pilot project plan
    - Identifying value chain partners
    - Building relationships
    - Managing key discussions
    - Developing a pilot project plan
- Stage III: Monitoring and evaluating the pilot project

In order to enable farmers to develop from a "food security" perspective to an "income security" perspective, Lundy et al. (2004) proposed a "market driven" approach in CIAT's field guide: *Increasing the competitiveness of Market Chains for smallholder producers*. In this strategy, the focus is not on improving the *productivity* of farmers (to produce more food), but rather on improving the *overall competitiveness* of farmers. Their approach to improve competitiveness is to organise farmers both individually and at market chain level in order to plan and co-operate with marketing actors in a co-ordinated manner.

According to this approach, once a target group and specific market chain have been identified, developing a strategy for improved market chain competitiveness consists of the following steps (illustrated in Figure 2.6):

- Mapping the market chain;
- Evaluating the level of business organisations along the chain;
- Reviewing the services available to support the selected market chain;
- Cataloguing past interventions in the territory, with particular attention paid to each case's impact upon the selected chain and chain actors;
- Analysing critical points for the development of the market chain;
- Developing a long-term strategic vision based on market prospects and possibilities for product and process innovation;
- Designing a set of strategies to resolve the critical points identified.

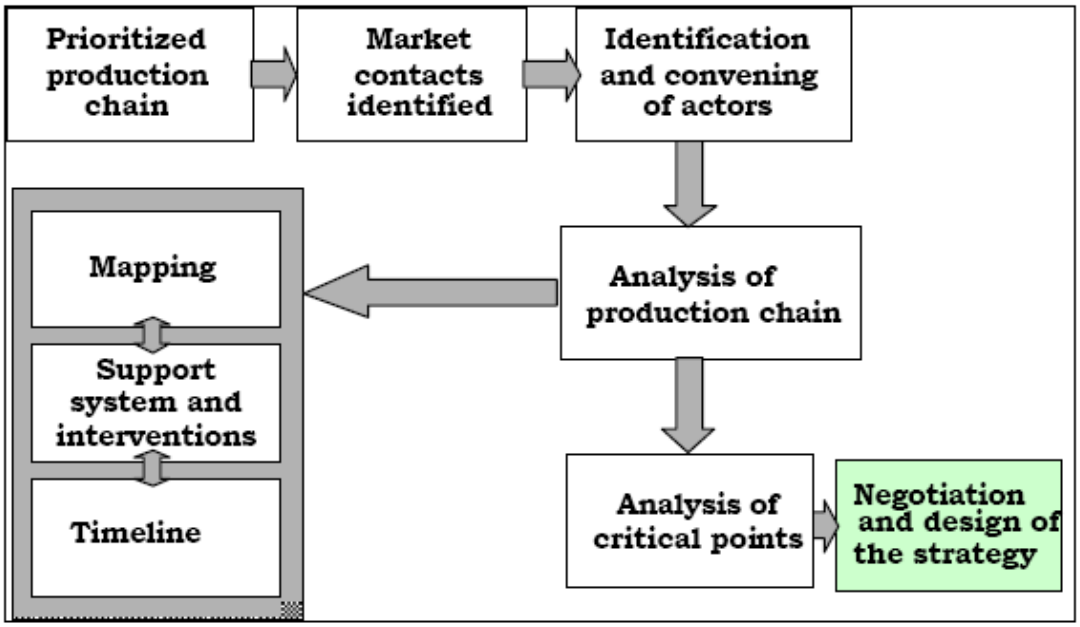


Figure 2.6 Stages in the design of a strategy to increase competitiveness
(Source: Lundy et al. 2004)

2.2.3 Conclusion on value chain analysis discussion

From the existing literature and work done on the improvement of competitiveness of small farmers through value chain development and interventions, the following conclusions can be made:

- Value chain analysis is a powerful tool to study and to optimise a sector, and is especially suited for this purpose in the agri-food sector;
- In the process of developing strategies for improved competitiveness or improved market access, value chain analysis is often the first step towards understanding the sector, identifying linkages, inputs and key areas for improvements and optimisation;
- The competitive advantage of a firm often lies in the difference between value chains and traditional supply chains. In this regard value should be added for all stakeholders and the consumer in the fields of communication, information, differentiation, value and quality, as opposed to just in the cost and supply of products. Furthermore, value should be added by offering products based on *consumer demand,* rather than what producers want or are used to supply. Firms

should also be interdependent, rather than independent, and their focus should be on optimising the supply chain, as opposed to optimising individual firms;

- Another strategic thought that should be considered in developing strategies for improved competitiveness of small farmers, is Lundy et al's (2004) reference to the fact that competitiveness often lies in the focus on producing more effectively (for instance through better utilisation of available resources, improved productivity or lower overheads), as opposed to focusing on producing volumes to improve competitiveness;
- Although there are a number of different viewpoints regarding the process of using value chain analysis for improving competitiveness and market access, the process comes down to more or less the same steps. The latter can be summarized in the following abbreviated format:

    - the identification of all stakeholders and actors in the value chain;
    - the mapping of the existing supply/value chain of activities;
    - the identification of key opportunities for upgrades or improvements in the chain;
    - the mapping of a more ideal value chain, taking into consideration possible upgrades, gaps or improvements to be made;
    - the development of an implementation plan or strategy.

With the background of the different methodologies of the *value chain analysis* process, and the different components of a value chain (as summarised in Table 2.1) in mind, the value chain of a typical horticultural chain, in which small farmers partake, will be discussed in the following section as background information on the sector.

2.3 The emerging farmer value chain

In the previous section, the importance and role of the horticultural value chain were discussed in terms of creating market access for small farmers, as well as improving the competitiveness of these farmers (individually and as a whole). The aim of this section is to map the value chain of emerging farmers in the horticultural sector in order to identify all the contributing linkages, as well as all the inputs required for their enterprises. This analysis includes the identification all actors/participants in the value chain, including primary suppliers, producers, distributors, marketing agents, customers and other role players.

In order to provide a better understanding of the horticultural industry's value chain, the most prominent actors and stages of a typical horticultural agro-industry are illustrated in Figure 2.7. The value chain of the South African horticultural industry will be closely related to this illustration, but the identification of more specific activities or processes for the South African context, as well as a discussion regarding these activities, follows[7]. As indicated earlier in Figure 2.1 and Table 2.1, the value chain of activities of a firm or industry can be grouped under a number of generic primary and secondary activities, which will be used in the discussion that follows.

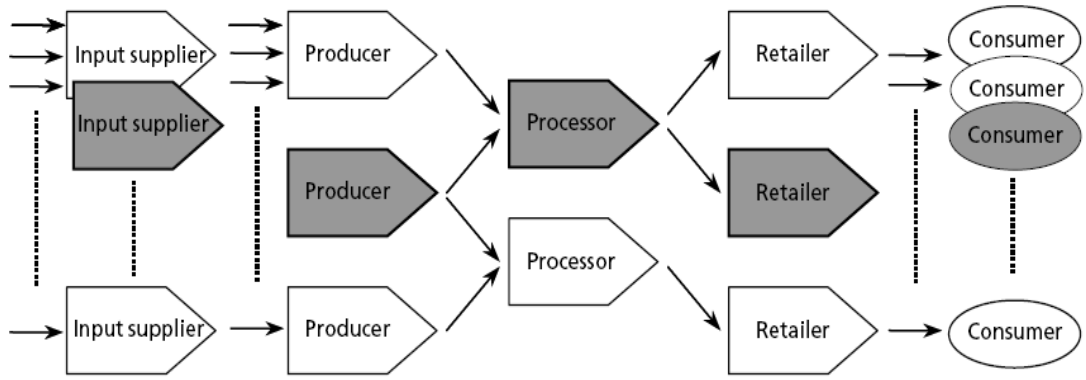


Figure 2.7 A typical fresh produce supply chain
(Source: Van der Vorst et al. 2007)

[7] The discussion of the value chain of emerging farmers was done based on practical experience on small farmer development and mobilisation projects for three years – the main source of the information is thus personal observations in the field and from informal discussions with farmers and agri-businesses encountered during this time. However, where possible, data was verified from published literature on the subject.

2.3.1 Inbound logistics

The inbound logistics of the sector consist of all activities related to the sourcing of inputs required for the primary production (or cultivation) of horticultural produce, and the sourcing of raw materials for adding value to the product that will be sold to the consumer. Both these activities are briefly discussed below.

2.3.1.1 Procurement and transportation of inputs to production areas

Various agricultural inputs are required for the primary production (growing or cultivation) process, including seeds and seedlings, fertiliser, pest control, weeding solutions, soil conditioners (compost) and growing mediums. The logistics of handling these inputs include the transportation of these products from the various manufacturers and suppliers to the production areas, the manner in which they are stored, as well as the method for transporting the correct quantities of the correct product from the storage area to the different areas of cultivation at the correct time.

Large input suppliers, such as nurseries and seed companies, often find small farmers that order products in relatively small quantities a nuisance, and in some cases even have minimum order quantities to evade the administration behind these orders. In cases such as these, farmers are indirectly “forced” to procure inputs from other actors further along the chain (such as retailers) who are prepared to trade products in smaller quantities, but at a premium on the manufacturer’s price, which includes the retailer’s profit margin.

Small farmers are often not able to procure appropriate products (such as the latest or most suited seed varieties) due to the high costs or unavailability of these products at retailers, or as a result of inexperience or ignorance from the farmer and/or retailer. On the other hand, large suppliers generally give discounts to big clients’ orders, deliver the product to their farm and add further value by providing extension services, crop and variety selections and planting programmes.

2.3.1.2 Transportation of harvested produce to a packhouse

Once the cultivated produce has been harvested, it should be transported from the point of harvest to a packing facility with temperature-controlled holding facilities (cold storage rooms) as soon as possible for food safety and product quality reasons. For this reason, fresh produce is usually harvested at night time or very early in the morning when the temperature is low, which enables the harvested produce to be transported to such a facility in a non-refrigerated vehicle.

Not all farmers have access to packing facilities and cold storage rooms – only large, established farmers with production volumes that could sustain a packhouse and its staff compliment have packhouse facilities on their farms. All production areas will also not necessarily be adjacent to or in the proximity of a packing facility. Unsorted and unpacked fresh produce could also be procured from other farms to increase the utilisation of packing equipment and staff, or to fulfil pre-negotiated orders.

The transportation of harvested produce does not have to be in temperature controlled vehicles, but care should be taken to handle produce correctly in order to reduce damages and loss in quality or shelf life.

2.3.1.3 Storage of fresh produce before operations

Products received at a packing or other value adding facility should be stored in bulk at ideal holding conditions (in terms of temperature and relative humidity) before being used. The quality and shelf life of produce not stored at ideal holding conditions will deteriorate rapidly, which directly influences the marketability of the product and the income potential of the product.

Temperature- and atmosphere-controlled holding rooms are capital intensive items, which is not justified in a small farming type setup. Therefore small farmers usually simply remove harvested produce from direct sunlight (i.e. in the shade of a tree or building) in an attempt to preserve the quality of the produce as much as possible.

The challenge caused by the lack of cold storage facilities is often overcome by small farmers by harvesting small volumes of produce (the volume is dependent on the size of transport and the time required to handle and load the produce) at a time. The harvested produce is then transported to the market or buyer during times of low ambient temperatures (i.e. early mornings, before sunrise) on a frequent basis to satisfy the customers' demand for fresh produce. This strategy, however, is dependent on the availability and access to transport.

2.3.1.4 Transport and storage of packing material

Before products cultivated on the farm can be marketed or sold to formal markets, it should be sorted and packed according to a certain criteria of standards. Sufficient quantities of the correct packing materials (bags, boxes, punnets, etc.) should be available at the packing facility. If the products are packed for a specific market as per a pre-negotiated contract, the buyer will usually supply the producer with the correct packing material.

Packaging material is typically manufactured and transported in bulk, so the farmer would need to order a critical volume of packaging material at a time, and have sufficient space to store this material according to good practices.

2.3.2 Operations

2.3.2.1 Primary production (Cultivation)

The cultivation of fruit and vegetables includes processes such as the preparation of land, soil conditioning, planting, applying fertiliser and pesticides, irrigation, pruning, weeding and harvesting. These activities can be done in different ways, ranging from basic and manual, to highly technical and automated (of which the most technical can be seen as *precision farming)*. Precision farming entails farming scientifically – all actions and inputs supplied to the plants under cultivation are based on careful calculations and accurate estimations. Optimum soil for the cultivation of specific

crops can be selected beforehand by means of soil samples, and the soil can also be conditioned by means of applying compost (to improve "soil life" or bacterial activity) or lime (to adjust pH) if required.

Automated planters can be used to plant seeds or seedlings at optimum intervals and spacing, and fertilisers and pesticides can be applied accurately. Seed suppliers generally provide farmers with specific planting programmes containing the information and timelines for the different activities to take place, and regular site visits by the suppliers enables them to adjust the plan based on scientific conclusions. For the more sizeable customers, assistance and advice on the handling of weeds and pests, as well as irrigation guidelines, can also be tailor-made for large areas under cultivation.

Irrigation and fertigation[8] infrastructure can be designed for areas under cultivation, with the optimum choice of irrigation system for optimum yields, operation costs and maintenance made during the design stage. Large irrigation systems are usually computer-controlled, and precise irrigation based on the requirements of the plants is therefore possible.

The abovementioned description of precision farming is included in this discussion to indicate some of the differences between large-scale and small-scale farming operations. Precision farming is done with the aim of optimising all activities and inputs in order to achieve the highest possible yield of the final product, similar to a factory or production line. Small farmers do not approach farming in this way due to the high costs and technology associated with it, as well as the lack of expertise and up-to-date information for making adjustments. It can therefore be argued that their operations are "non-precise", and as a result their outputs achieved are not optimal.

Most of the activities of small farmers are still done according to traditional practices and beliefs (not out of will, but because of the lack of knowledge, experience and/or resources). Soil preparation and planting is done by hand in many cases, although some small farmers do have access to tractors with ploughs. Fertilisers and

[8] Fertigation is the practice of applying fertilisers to plants through means of an irrigation system

pesticides are applied manually based on general information available and not necessarily according to site specific requirements. In many cases, farming is done *dryland* (in other words their crops' access to water is rain dependent) or by means of flood irrigation, which is difficult to control. In the dry seasons, yields and quality of products are generally poor, and in many cases it is not profitable to even cultivate during the dry seasons without irrigation.

Therefore, even though the cultivation process of the average small farmer in South Africa is less capital intensive, it is not as optimised and controllable as for large-scale farming[9]. This uncontrollability, coupled with the non-optimised utilisation and application of resources and inputs, has a direct impact on the quality and yield of their final products.

2.3.2.2 Packing operations

Packing operations consist of washing, sorting, grading, sizing and packing, after which packaged products are stored again until distribution. Fresh produce is sorted and classified as *Extra Class*, *Class I*, *Class II* or *Class III,* based on their outward appearance (colour, injuries, blemishes, etc.), internal qualities (free from chemical residues, not hollow, etc.) and weight (for instance, a weight tolerance window, as well as the maximum weight and size is specified for a class I product). The *Food Safety and Quality Assurance Directorate of the National Department of Agriculture* (available at http://www.nda.agric.za/) publishes South Africa's quality standards for fresh produce – an extract of the grading criteria containing the standards for grading and sizing potatoes in South Africa, is attached as Annexure A as an example.

There is no specific criteria for Class III produce, but it is accepted that a product not adhering to the criteria of a Class I or II product, but still suitable for human consumption, will be classified as a Class III product. Produce not suitable for human consumption is classified as waste products, which are dumped or used for animal feed or for the manufacturing of compost.

[9] Although not all large scale farmers farm on precision agricultural principles, their practices lean more towards these principles than the traditional principles of most previously disadvantaged farmers.

The activities of a packhouse should add value to produce in such a way that it addresses all the requirements in terms of quality standards for the marketing and exporting of the product. Packhouse equipment can vary from large, sophisticated, product-specific, automatic grading, sorting and packing equipment (that can comfortably wash, sort, grade and pack 100 tonnes of fresh produce per day), to very simple sorting and packing tables that could fit into a modest sized room (on which a person can manually pack 1 tonne of fresh produce per day). However, many small farmers do not have access to a facility or even basic equipment for sorting and packing produce, and many of them do not have access or the capacity to utilise the specifications and criteria for the classification of produce either.

2.3.2.3 Processing

After products have been sorted and graded according to quality standards, the lower quality produce that will not achieve a good financial return in the fresh market (or which is not suitable for marketing in a fresh state), is processed. Processing includes, amongst others, the manufacturing of the following popular products from raw fresh produce:

- Pulps and juices
- Purées
- Jams
- Canned or bottled fruit
- Freshly cut and packaged produce (for instance freshly cut salad mixes)
- Cut and frozen vegetables (for instance frozen chips)

Processed items are usually shelf stable products (in other words, they could be stored for a longer period of time), reducing the risk of product losses due to a saturated market, low prices or logistical issues. These products can then be fed to

the market at strategic times, for instance when the particular product is out of season in its fresh form, or when the product is required based on the demand from buyers.

Larger farmers have processing plants on their farms, although the recent trends is for this activity to be handled by large, specialist processors (for instance *Appletiser* [juice from apples, pears and grapes], *Tiger Brands* [tomato and other sauces from tomatoes and various fruits], *McCain's* [frozen vegetables from potatoes and other vegetables], etc.). The larger processors prefer high volumes of processing grade produce that have already been removed from the fresh market produce. In order to gain the optimum advantage through processing (as activity to absorb lower quality produce), a sorting process should thus precede processing. The price paid for processing grade produce is significantly lower than the price paid for fresh produce, and therefore the produce that could have been sold in its fresh form should be removed first. The negotiation of supply contracts is also common in order for processors to secure a critical mass of raw material for their processing plants.

Processing can potentially be a suitable market for resource poor farmers cultivating produce on low capital methods (which include no irrigation, poor scheduling or no application of fertilisers or pesticides, no access to cold storage facilities, etc). The quality and yield of the majority of crops cultivated on these methods should be of a "lower Class II", or processing grade standard, which would not be marketable in a fresh form. Processors would, however, be able to process this produce as an attractive and edible product. Through processing, a farmer would therefore not receive the full potential income that could have been achieved had the product been sold fresh, but at least he would be receiving some financial returns on his harvest.

The discussion above indicates the importance of each of the three major *operation activities* within the horticultural value chain, and why small farmers with no access to these facilities and infrastructure struggle to gain market access or to grow their enterprises.

2.3.3 Outbound logistics

2.3.3.1 Storage of final products

Once value has been added to the raw material (harvested fresh produce) at a packhouse or a processing facility, the final product in its packaged form should be stored at ideal holding conditions, which differ from product to product. Shelf stable products (processed products with added preservatives) can be stored in non-refrigerated holding areas for long periods, while perishable products (fresh and some processed products without added preservatives) should be stored in climate-controlled holding areas.

Commercial cold storage facilities are available in some industrial areas, specifically at markets and near harbours or airports. Storage space at such facilities can be rented out at "pallet-per-day" rates, which add to the costs of the product, without adding any value other than keeping the product presentable and marketable. Similarly to any other product in a supply or value chain, the storage time of agri-food products should therefore be as short as possible in order to optimise the price of the final product.

2.3.3.2 Transportation of final products to markets, processors and consumers

Perishable products (fresh or processed) have a limited timeframe (of at most a few weeks) within which it should be consumed before it becomes unsuitable for human consumption. It is therefore essential for reliable and efficient logistics to be in place for products to be transported to their destination as soon as possible. Transportation of perishable produce should occur within the correct holding and handling parameters in terms of temperature and relative humidity – a process which is known as *transporting it within the cold chain*. The adherence to the cold chain is critical for food safety, quality and shelf life of fresh produce.

Table 2.4 is an extract of guidelines for a selection of popular products to indicate the complexity of transporting and holding fresh produce.

Table 2.4 Ideal holding temperatures of a sample of perishable fresh produce
(adapted from International Air Transport Association 2005)

Crop	Minimum holding temperature [°C]	Maximum holding temperature [°C]	Minimum Relative humidity [%]	Maximum Relative humidity [%]
Apple	-1	2	90	95
Beetroot	0	4	98	100
Broccoli	0	4	95	100
Cabbage	0	4	98	100
Lemon	7	10	85	85
Lettuce	0	4	98	100
Potato	4	8	90	95
Tomato (green)	13	15	90	95
Sweet potato	12	15	85	90

Table 2.4 is shown only as an example of some of the specific parameters within which fresh produce should be transported and stored for optimum shelf life and quality. Other parameters which should be considered are carbon dioxide production rates, respiratory behaviour during ripening, ethylene production rate and behaviour in ethylene environment and chilling sensitivity of produce. These are not discussed since the details are not relevant in the context of this study. The objective of this discussion is to illustrate the complexity in terms of infrastructure, knowledge and logistics required as part of the cold chain.

In order to extend the shelf life and presentability of fresh produce, proper controlled temperature rooms, and in some cases controlled atmosphere and/or ripening rooms, are required at the point of marketing. Research done by Sautier et al (2006) indicates that the share of fresh produce procured by supermarkets via the National fresh produce markets is declining. Based on their calculations, only about 10% of the fresh produce procured by supermarkets in South Africa comes via the "traditional" public marketing system, with the rest procured directly from producers. The reasons for this decline are attributed to the lack of proper cold chain management by markets, inadequate tractability to farm level, and food safety issues resulting from inadequate market infrastructure and/or management (Biénabe & H. Vermeulen 2007).

2.3.4 Marketing and sales

The marketing of fresh produce is a significant part of the horticultural value chain – being unsuccessful in this link of the chain would undo all the previous actions. If the produce that has been cultivated by a farmer is not marketed and sold, it will end up on the compost heap or dumping ground without realising a return on the investment and effort made by the farmer.

Different market segments exist for fresh produce, each with its own requirements based on consumer demands and buying power. Farmers in South Africa therefore have access to different markets that absorb fresh produce of all qualities. The different marketing channels that are available for the fresh produce trade in South Africa are listed in Table 2.5 overleaf.

Figure 2.8 is an illustration of how Van Deventer (2006) sees the South African retail market and market segments, based on research conducted by *Freshmark, the* fresh produce procurement and distribution division of the largest supermarket in Africa, namely *Shoprite Checkers*. The majority of consumers have a relatively low income (less than R900/month per household at that stage[10]), and are not able to afford high quality fresh produce. The members of this group demand a basic product with no frills or added value that could

[10] Although the income figures are dated, the illustration and the relative weights per segment should not be very different than what it was in 2006 – the figure is thus only for illustrative purposes and the references to specific figure income levels have been removed for the purposes of this discussion.

increase the price. Although the customers in this market segment cannot afford the highest quality, the freshness and value for money is still important. This trend is also evident when the buying patterns of people buying from informal traders are analysed – although the produce sold at these stalls is often of Class II or Class III quality, the customers will not simply be buying produce that is inexpensive, but they would still be looking for the best quality that they can afford (Van Deventer 2006; De Wet 2004).

Table 2.5 Typical target markets for different quality spectra of fresh produce
(adapted from de Wet 2004)

QUALITY SPECTRUM	TARGET MARKET CHANNEL
"Extra" Class	• International retailers • High value local supermarkets and deli's
Class I	• International fresh produce markets • International supermarkets • Local supermarkets
Class II	• National Fresh Produce Markets [NFPMs] • International and some local food processors • Informal traders (hawkers; pavement traders)
Class III	• Local food processors • Informal traders (hawkers; pavement traders, spaza shops)

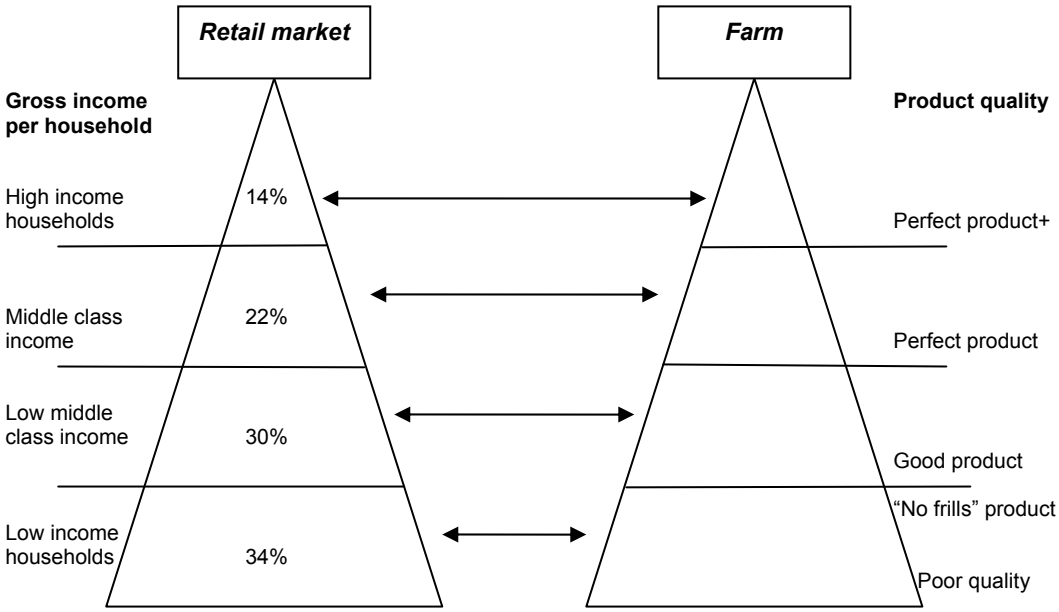


Figure 2.8 Fresh produce market segmentation in South Africa
(Adapted from Van Deventer 2006)

Another set of statistics representing the marketing channels of fresh produce in South Africa, is the share of formal marketing channels of fruit and vegetables, set out in Table 2.6 below.

Table 2.6 Marketing of fresh produce in South Africa (adapted from Sautier et al. 2006)

Market Channel	Fruit	Vegetables
Exported	35 %	6 %
Supermarkets	31 %	31 %
National Fresh Produce Markets	13 %	51 %
Processing companies	21 %	12 %

It is interesting to note that, from the statistics given in Table 2.6, individual small farmers typically only have access to about 21% of the "formal[11]" fruit market, and about 12% of the "formal" vegetable market. This conclusion is drawn from the fact that small farmers, due to their small volumes, struggle to penetrate "formal" markets where produce competes with that of larger, commercial ventures. Because of the low volumes and (generally) poor quality of produce from emerging farmers, the only market segment that would accept their produce is the processing sector. In some cases, processing companies would accept the low volumes of produce from small farmers, and, coupled with similar produce from other farmers, would be able to process the products into a presentable and marketable final product.

Nationally and internationally, private companies ("formal markets" in the form of supermarkets and other buyers) prefer to procure from large-scale or organised farmers rather than individuals (Beijing Conference Issues Paper 4 2008; Vorley et al. 2008; P. Van Zyl 2007; Louw et al. 2006), which means that small farmers are generally marginalised in supplying fresh produce to these markets.

The opportunities (or lack thereof) for a typical small farmer in each formal market can be summarised as follows:

- Export markets are suitable mainly for very experienced and established commercial farmers, or even groups of farmers, because of, amongst others, the high standards, infrastructure and business skills that are required. There is also great difficulty in gaining access to and securing a market, as well as a high risk in sending produce to distant markets;
- National Fresh Produce Markets require produce that is sorted, graded and packed according to set standards which are comparable to the rest of the produce on the sales floor. They often trade in volumes of 1 ton at a time (although smaller volumes can be traded);

[11] For the purpose of this document, "formal" markets refer to commercial trading ventures such as supermarkets, processors and other facilities where the consistency of quality, supply volumes, price and variety of products are fundamental, as opposed to "informal markets" such as hawkers and certain farm stalls which normally trade in fresh produce on a "buy-and-sell day-per-day basis".

- Supermarkets have stringent protocols that are in place with regards to hygienic handling, processing and storage practices, and they prefer to contract larger, established farmers who can supply the volumes required at the times requested;
- Therefore it is only the processing market, meant for the "reject" (oversized, undersized or naturally or mechanically damaged) produce, to which small farmers have a reasonable chance of supplying their produce. The financial returns in this market are lower than those of fresh supply markets.

Figure 2.9 is another illustration that describes the dynamics of the fresh produce marketing industry in South Africa. It is taken from research done on emerging farmers in Southern Africa, with specific reference to KwaZulu-Natal, the Eastern Cape and the Western Cape (see for instance De Wet 2004). Typically, South African Class I fresh produce (highest quality, meeting the criteria of northern hemisphere importing countries) is exported or sold in local supermarkets. Class II fresh produce is marketed amongst formal and informal markets. Class III produce (products that have been "downgraded" because of external deformities such as an odd shape or sunburn marks, but could still be edible and high in flavour and nutrition) is normally processed in order to utilise the product and to make the produce more presentable and desirable for the consumer.

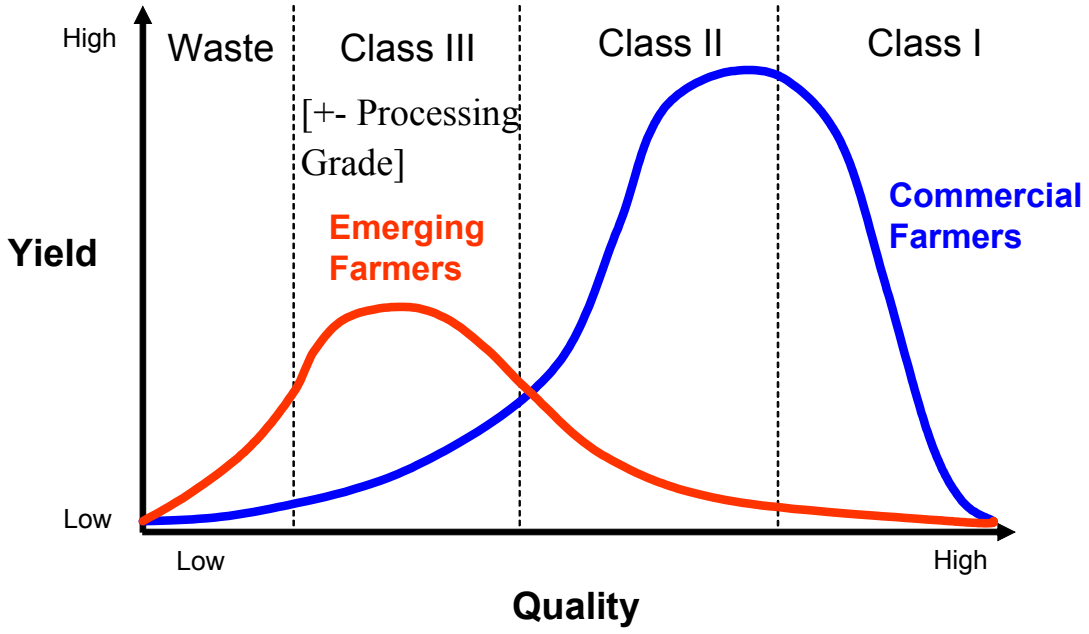


Figure 2.9 Conceptual representation of quality distribution vs. yield of a typical perishable crop of a typical commercial farmer vs. a typical emerging farmer in South Africa
(Source: De Wet 2004)

Note the significant difference in quality and yield distributions of small-scale emerging farmers compared to commercial farmers. The quality distribution of a small, inexperienced farmer, differs from that of an experienced commercial farmer due to a lack of knowledge, skill, experience, the correct inputs, equipment, infrastructure and other factors. The majority of the harvested produce will be of processing grade, with some produce fit for the local market.

To conclude this discussion on agricultural marketing dynamics and the importance of marketing in the agricultural value chain, the following main thoughts are highlighted:

- To be competitive in agriculture in a modern agri-food industry, the entire quality spectrum of a harvest should be absorbed by the market – the formal marketing segment (export market and supermarkets) has the most stringent requirements, but the returns are also the highest in this sector;
- Formal markets generally demand adherence to quality and food safety criteria, minimum volumes of produce and sustainable supply throughout the season. Small farmers farming individually on a small scale do not have the resources or supply volumes to address the above requirements of formal markets, and therefore struggle to penetrate and supply these markets;
- Due to small farmers' lack of appropriated resources, the quality of their produce is generally lower than that of large-scale commercial ventures. The prices obtainable for this lower quality produce are lower than those for higher quality produce.

The abovementioned conclusions regarding the importance of marketing and the marketing dynamics of South African agriculture indicate that a generic strategy for the improved competitiveness of emerging farmers should be to endeavour to sell the entire spectrum of their harvest – even the lowest quality produce – to the relevant market segments. However, this strategy is dependent on the ability of the farmer to penetrate the different market segments.

2.3.5 After sales services/activities

The nature of horticultural products does not suggest that activities regarding after-sale services are a big concern, especially in relation to other industries (such as electronics and motor vehicles) where guarantees of workmanship are important strategic considerations. However, there are some "after-sale activities" in the horticultural value chain that one should take note of. These are briefly discussed below:

2.3.5.1 Dumping of unsold produce

Depending on the destination market for final products, the producer may be liable for the costs associated with dumping fresh produce not suitable for human consumption. This could be due to poor handling on the way to the market or consumer, or because the original quality of the product prevented it from being sold before becoming spoilt.

2.3.5.2 Food safety standards tracking/traceability

Due to the latest international food safety standards and requirements, in particular GLOBALGAP (Global Good Agricultural Practices standards), South Africa's PPECB (Perishable Products Export Control Board) and other supermarkets' requirements (such as Woolworths South Africa's standards and the BRC [British Retailer's Consortium] standards), the tracking of the origin and the value chain of any batch of produce to be sold worldwide is becoming more important. The protocols and standards regarding traceability enables buyers to "track" the location of origin and activities that were part of the chain preceding them buying the product. Traceability is necessary to ensure that, should incidents relating to poor agricultural practices or food safety (such as food poisoning) occur, they could be followed up and investigated in order to identify and rectify the cause. All parties in the chain of activities therefore remain liable even after the produce has been sold, and in order to supply the "higher end" markets, adherence to these protocols is a pre-requisite.

Should a producer want to deliver produce to the higher end of the consumer market, activities regarding the tracking of produce are applicable. It is unlikely (though possible) that a supermarket would accept produce from small farmers without being able to prove to its customers that proper food safety standards were in place and being monitored.

2.2.6 Support activities that influence the supply chain

The most important items relating to support activities that influence the horticultural supply chain are briefly discussed in this section. The support activities mentioned here are all examples of items that are not directly linked to the primary production or value adding of horticultural produce, but that have an influence on the final product or success of the industry.

2.2.6.1 Firm infrastructure

- **Planning and management:** Time should be invested in a marketing plan and in the optimisation of a farm's master development plan to lead to a specific market penetration plan and product absorption plan. Human and financial resources should also be managed accordingly in order to implement the farming entity's vision by supporting primary production and value adding activities.
- **Food safety and quality control implementation:** To access formal markets, producers and other stakeholders in the chain require that stringent quality and food safety controls be in place. Care should be taken by personnel to ensure that food safety criteria are adhered to during the entire value chain process.

2.2.6.2 Human resource development

- **Training:** All staff should be trained according to what is required of them, and made aware of the bigger picture and how it relates to the seemingly minute tasks that form part of their jobs. By training staff, human capital increases in value and one creates the opportunity for knowledge transfer and the empowerment of workers.

2.2.6.3 Technology development

- **Research and development:** Technological advancements in terms of new product varieties, modern packaging, and handling and transportation methods can result in improved competitiveness by saving costs and time, or in supplying a better end product.

  With the abolishment of the South African Agricultural Boards (mostly in the early 1990's), much of the focus and resources enabling research into and development of new varieties were halted. However, crop-specific marketing boards, as well as the Agricultural Research Council [ARC], still continue with support for farmers through research into potential new varieties with improved yields, improved shelf life or niche products[12] – all of which improve the competitiveness of South African agriculture as a whole, as well as specific industries.

- **The advance and implementation of modern and appropriate equipment**: Competitiveness in large-scale agriculture is often due to the optimum utilisation and application of appropriate technology. In the case of smaller scale farmers, sufficient attention should be given to appropriate

[12] In a relevant example, the ARC has recently proposed an "alternative" variety of the traditional South African sweet potato (an orange variety) to be produced by urban farmers in the Cape Metropole, since this variety is better suited to the natural environment, and the nutritional value of the product addresses the needs of the people of that area. In another example, the ARC has recently developed the ability to grow seedless lemons in South Africa, a world-first and thus a niche product that improves the competitiveness of agriculture in South Africa.

small-scale technology in value adding, production and irrigation systems. Other options for improving the utilisation of more modern and appropriate technology could include the sharing or multi-usage of equipment by a group of farmers, or the master design of infrastructure and irrigation systems for groups of smaller farmers, instead of smaller, inefficient systems for individual farmers.

2.2.6.4 Procurement

- **Supermarket procurement:** The modern trend amongst supermarkets is to abandon the traditional way of sourcing agricultural products from public markets, and to procure directly from producers that are part of an integrated supply chain (through a contract with the buyer) instead (Van der Meer 2004). Over and above the fact that fewer handlers in the supply chain hold the potential for higher margins for both the buyer and the supplier, procuring through preferred suppliers by means of integrated supply chains also offer more peace of mind for both parties. For the buyer it provides assurance in terms of reliance of supply, traceability, certification of good agricultural practices, products and varieties to be supplied and value to be added (packaging format for example). For the supplier it provides security of a market even before production has commenced.
- **Procurement of farmers' inputs:** The availability of specialist suppliers' products (seeds and inputs, seedlings, fertiliser, irrigation equipment, etc), the competitiveness of input prices, account payment procedures and support services provided by supply firms, all play a direct and indirect role in the competitiveness of the agricultural value chain. The direct impact is due to the quality of inputs that could be supplied, as well as the financial impact of inputs' prices, while the indirect impact is due to the supporting activities and assistance provided to farmers. The input supplier therefore plays an important supporting role in terms of the competitiveness of an agricultural value chain.

The various activities that form part of the agri-food value chain – from production to consumption, including primary and supporting activities, the value chain of horticultural production and marketing for a typical commercial farming operation up to the point of marketing – are all illustrated in figure 2.10 overleaf. As another illustration, a comparison between large-scale and small farmers with regards to some of the most significant factors is summarised in Table 2.7.

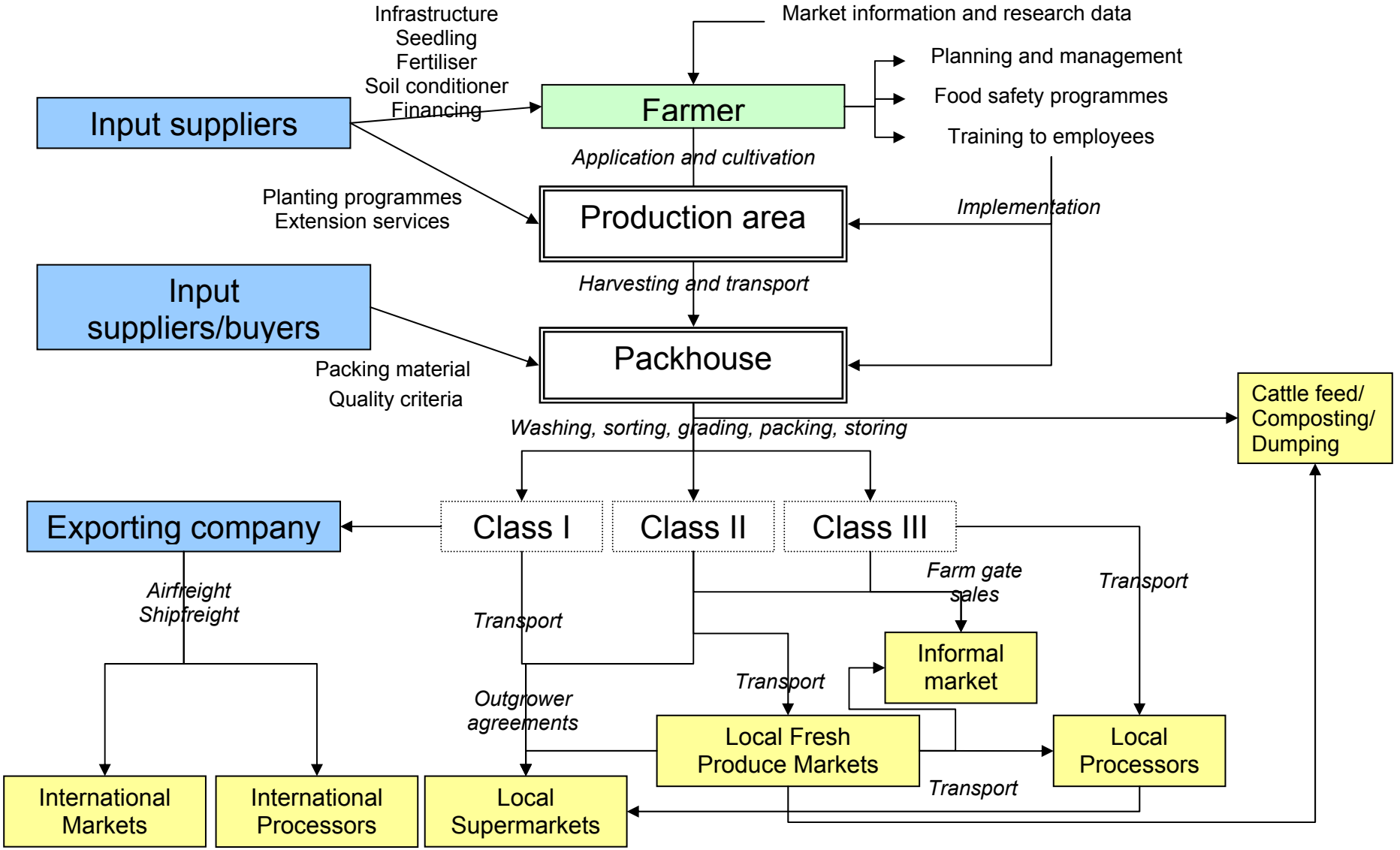


Figure 2.10 Value chain of a typical commercial farming operation in South African from cultivation to marketing

Table 2.7 Summary of main differences between typical larger and smaller farmers in South Africa

	Typical large-scale South African farmer	Typical small farmer
Capital	Assets (such as farm or future earnings based on a supply contract) can be used to mobilise funding	Few collateral to mobilise funding; Capital available through government support programmes, though waiting period is often more than one season
Assets	Large production area that warrants machinery, equipment and management staff; Usually have access to appropriate machinery and equipment	Small production area, production volumes too low to justify or afford new equipment; Farms gained through land redistribution programme can often not be used as collateral to apply for operational or capital funding
Experience and knowledge	Years of knowledge and experience passed on through generations; In most cases, formal agricultural education and training for farming and managing on a large scale	Often inexperienced; Often did not have the opportunity for tertiary education
Procurement of inputs and supplies	Large orders and longstanding relationship with suppliers enable farmers to source inputs on credit and in some cases at discounted prices	Nurseries and seed suppliers reluctant to deal in small volumes of seedlings and other inputs, also reluctant to supply on credit to inexperienced farmers
Production	Modern and appropriate production methods, including irrigation systems, fertiliser application and precision farming	Traditional, no or low technology machinery, no or outdated irrigation methods, low planning or scheduling of irrigation,
Extension services	Planting programmes and extension services provided by seed suppliers and nurseries to bigger clients	Public extension officers provide assistance, but in many cases not enough officers to give sufficient attention to the projects at hand
Value adding	Final products can be presented professionally and according to benchmark criteria because of access to equipment to wash, sort, pack etc, as well as knowledge and understanding of market demands; Often diversified supply (product range and value added products)	Volumes (overall and volume of “higher” quality) does not justify value addition processes; Usually no branding of produce
Management	Large scale of operations result in big overhead costs and extra management/large management structures to manage farm	Small scale of operations enables faster response to markets; Lower overhead costs due to owner-management and family labour; Potentially better management (owner manager)
Public assistance	Very little or no public assistance due to drive by government to transform agricultural sector (transform previously disadvantaged farmers from subsistence farmers to commercially orientated farmers)	Capital grants available through most departments; Department of Agriculture providing support through its Comprehensive Agricultural Support Programme [CASP]
Marketing of product	Access to formal markets due to sufficient volumes, adherence to quality standards and implemented handling and holding protocols	Access to formal markets difficult due to low volumes, erratic supply, non-compliance to food safety requirements and no value adding of produce

2.3 Summary and conclusions

The discussion of the horticultural value chain, and the distinction between large-scale and small farmers of South Africa based on their respective value chains and access to resources (Table 2.7), illustrate the perception that large-scale farmers are generally more competitive than small farmers. Smaller farmers do not have the resources to partake in all the activities, which necessitates them to outsource or do without them, a situation which either adds to the costs to be shared in the chain, or results in an inferior product.

The lack of resources and the small scale of operations (low volumes do not justify further investments for production and value adding improvement) are the major constraints that prevent small farmers from entering formal markets. From the discussion in this chapter, it was shown that the development of the value chain is a proven mechanism for empowering small farmers in terms of market access. However, in order to improve the situation of small farmers in the South African horticultural production and marketing environment, one will also need to address the "small-scale factor" constraint without taking away the advantages of "farmer-manager" or "family" style farming. The scale of operations therefore needs to be enlarged to a critical volume, most likely through the co-operation or collective action of farmers. In addition to this, "organised access" to formal markets and improved relationships with input suppliers will need to be created in order to address the farmers' lack of optimum inputs. A framework for the improved competitiveness of this sector will therefore have to be two-pronged – focusing on the vertical integration of the supply chain to improve competitiveness and market access, and also focusing on the horizontal integration to improve the volume of supply and consistency of supply to the accessed markets.

Similarly to Porter's concept of a *value system*, Lazzarini et al (2001) developed the concept of *netchains*, which consists of the interaction and linkages of vertical supply chains and horizontal networks. The addition of horizontal linkages (networks or clusters of firms) provides increased potential and probability for small firms to cope with stringent quality criteria and other demands from chain partners (Ruben et al. 2006). The netchain can therefore be seen as clusters of networked firms that form part of an integrated value chain. The interdependencies amongst the extra tiers of firms add the following value to normal value chains:

- *Reciprocal co-operation based on mutual exchange between suppliers;*
- *Sequential delivery systems based on planning along the supply chain;*
- *Pooled interdependencies at business level to guarantee standardisation and harmonisation of processes.* (Ruben, Slingerland & Nijhoff, p 7, 2006)

The concept of *netchains* is illustrated in Figure 2.11.

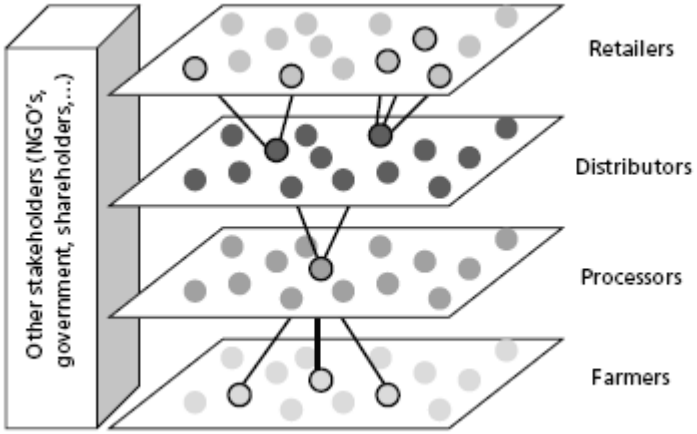


Figure 2.11 A netchain structure
(Source: Lazzarini et al [2001] in Ruben, Slingerland & Nijhoff, 2006)

In order to reach competitiveness in the agri-food industry, it is critically important to meet the requirements in terms of volumes, scope and quality. Furthermore, it requires a concerted effort to link the different stakeholders in the supply chain or *netchain* in order to gain this competitiveness for small-scale farms (Ruben, Slingerland & Nijhoff 2006). Supply chain collaboration is critical for the competitiveness of small farmers with regards to the following aspects:

- Access to new and profitable market outlets, based on supply-chain management for innovative product-market combinations;
- Network governance, for enabling timely responses to demands for capacity development and knowledge transfers;

- Chain upgrading through partnerships that increase the size and distribution of value added.

From the conclusions of this chapter, as well as the brief discussion on the concept of netchains, it is suggested that, in addition to integrated value chains, the clustering or arranging of farmers in order to co-operate could potentially improve their competitiveness. It is therefore suggested that the Framework for the improved competitiveness of small farmers should, in addition to the process of a value chain analysis (which was discussed in this chapter), also analyse the potential to cluster farmers together for improved competitiveness. The following chapter will investigate clustering and collective action models, the suitability of these concepts for the agricultural sector, and the benefits that could be created through the implementation thereof.

CHAPTER THREE

CLUSTERING FOR IMPROVED COMPETITIVENESS

3.1 Introduction

In the previous chapter, guidelines for analysing value chains – with the aim of developing and improving the competitiveness of resource poor farmers through better linkages – were discussed. The value chain of a typical horticultural industry in South Africa was also drawn up, with the purpose of providing a better understanding of the sector.

Looking at the literature regarding models and tools for the improved competitiveness of small firms, a number of conducted studies that pertain to the *growth*, *improved competitiveness*, *productivity* and *efficiency* of *small firms* (Schmitz 1995; Schmitz & Nadvi 1999; McCormick 1999; Ingley n.d.; Neven & Dröge 2001; Humphrey & Shmitz 1996; Tallman et al. 2004) are identified. It is interesting to note that all of these studies have found that the *clustering of small firms* can create a competitive advantage for the particular industry, as well as for the individual small firms that are part of a cluster.

Most of these studies, however, focused specifically on the co-operation and clustering of small *manufacturing* firms – very little data or strategic models specifically considering the clustering or collective efficiency of farmers or firms in the agricultural and agro-food industry were found. Although agriculture can be seen as a "manufacturing" industry in the sense that the process of cultivation starts off with a number of raw materials – with the aim of producing a final product for the consumer market – a number of important variables are present in the horticultural (and agricultural) sector, but not so in other manufacturing industries:

- Horticulture is dependent on the natural environment and climatic conditions, which in most cases are not controllable (for instance precipitation[13], temperature and chill/heat units[14], climatic conditions at time of harvest, the occurrence of natural disasters and pests, etc.). In modern agriculture many of these climatic and natural condition constraints are controllable, but only at a high price which often makes the ability to control not feasible;
- Fresh produce is a perishable crop that only has a certain timeframe in which it can be consumed before it is deemed unfit for human consumption. With the perishable nature of the product the logistics involved are more demanding than for non-perishable items produced in the manufacturing industry;
- The "manufacturing" of fresh produce has a long lead-time[15], typically between a few weeks (cash crops like lettuce and tomatoes) to a few years (perennial crops like apples and apricots) from the time of planting;
- The fresh produce marketing sector is a volatile market, mainly because of the reasons listed above. From the time of planting to the time of harvesting, the supply of and demand for the specific product could have changed a few times. A natural disaster could have struck that would have created a shortage of a particular product, thereby driving offered prices upwards. Likewise, climatic conditions could have been favourable for all producers in a particular season, creating an over-supply, which would result in a drop in the offered price for the product.

Despite the abovementioned contrasts between the agricultural and manufacturing sectors, the principles of business (to produce a product, that is demanded by consumers, at a price that the consumer is willing to pay and that will result in a profit for the producer) remains the same.

The major constraints faced by small farmers (which were listed in §1.4.2) correlate with Schmitz's (1995) findings regarding the constraints faced by small firms in the manufacturing industry:

[13] Precipitation is the quantity of water falling to the earth at a specific place within a specific period of time

[14] Heat units refer to the certain upper and lower temperature limits where crop growth are retarded or stops. Chill units refer to the temperature limits that certain crops require for their dormancy period to form fruit (Smith 2006).

[15] Although it can be argued that products from some other industries also have long lead times, the perishability of the final product in the case of agriculture plays a significant role. Perishable products should be absorbed by the market as soon as possible after it has been "manufactured", otherwise they become unmarketable.

- Low levels of product and process technology;
- Small product markets;
- Lack of access to capital;
- Lack of physical infrastructure;
- Weak institutional frameworks for addressing constraints.

This correlation suggests that, although most of the research done on the improved competitiveness of small firms applies to the manufacturing environment, these models are also appropriate for investigating the competitiveness of the small-scale and "low technology level" sub-sector of agriculture.

In the previous chapter, the concept of netchains was discussed as a potential solution for the improved competitiveness of small-scale agriculture. Netchains incorporate clustering in value chains, which suggests that the concept of clustering, which is often used as a strategy for improved competitiveness in manufacturing industries, could work in the agricultural sector as well.

The focus of this chapter is on the analysis of the concept of clustering, its suitability as strategy in the small-scale agricultural industry, and its relationship with competitiveness. Firstly, this will be done by explaining the significance of the industrialisation of the agricultural industry in terms of growth and competitiveness, after which the correlation between clustering and growth in small firms will be examined. This will be followed by a discussion on some different views on clustering, and how the potential of clustering could be analysed as part of the Framework. Different cluster analysis models, that have been used to analyse and promote clusters in developing countries and industries, are also discussed.

The chapter concludes with a discussion regarding case studies of co-operation in the small-scale agricultural sector, and the identification of *key success factors* that contribute towards the economic success and growth of clusters of small farmers.

3.2 The industrialisation of the agricultural industry

The organising, expanding and development of an industry – with the aim of becoming more productive, efficient and/or profitable – is often referred to as an *industrialisation process*. Industrialisation is also often seen as the process of developing more productive and technologically improved industries in the place of low level agriculture (see for instance the definitions below). However, one cannot help but to compare the shifting of farming from a *subsistence mindset* to a more productive one, to the process of industrialisation often used in the manufacturing sector. In fact, according to the on-line encyclopaedia *Wikipedia*, industrialisation in the agricultural sector came about in the British Agricultural Revolution during the 18th and 19th centuries as a result of new innovative farming techniques, mechanisation and food processing. This process evolved subsistence farmers into more productive, commercial farmers. Industrialisation also had the added advantage that it resulted in economic growth within the agricultural supporting industries (http://en.wikipedia.org/wiki/Industrialization).

To gain a more thorough understanding of the concept of *industrialisation*, particularly with regards to what is meant by it, and its objective and correlation with growth and productivity, an investigation was done into its exact definition. This process defined *industrialisation* as being, among others, the following:

- *The process through which industrial capacity is created, which results in an increased range of goods and services and potentially higher living standards (ucatlas.ucsc.edu/glossary.html);*
- *The development of an industry on an extensive scale (wordnet.princeton.edu/perl/webwn);*
- *The introduction of factory systems or specialised establishments where there is centralisation of power-driven machinery and where workers gather specifically for the purpose of production (www.socialpolicy.ca/i.htm);*
- *When used in agriculture, industrialisation refers to the consolidation of farms into very large production units (www.ees.adelaide.edu.au/icooper/glossary/i.htm).*

From the definitions given above, industrialisation (out of an agricultural context) can therefore be seen as entailing an increase of activities to an extensive scale, an increased range of goods and services and the quality thereof, as well as an increased focus on production for a specific market. These increases and improvements are normally dependent on the increase in technology and equipment that is utilised within the sector, as well as the organisation or consolidation of all role-players. Within the context of South African agriculture, commercial farms can be seen as industrialised farms, based on the definitions above.

Elsewhere, Reardon & Barret (2000) refer to *agri-industrialisation* as a concept consisting of three sets of changes in the agricultural industry of a specific area:

- *The growth of agro-processing, distribution and farm-input provision activities undertaken by off-farm agri-businesses;*
- *Institutional and organised change in the relation between agro-industrial firms and farms, such as increased vertical co-ordination;*
- *Concomitant changes in the farm sector, such as changes in product composition, technology and sectoral and market structures.*

Their definition of industrialisation in the agricultural sector, which includes improved value chains and the connections between farmers and specialist input providers, correlates closely to the concept of netchains (improved vertical and horizontal linkages). This indicates a possible relation between *industrialisation*, *clustering*, *value chains* and *competitiveness.*

From the abovementioned definition of agri-industrialisation, it is clear that South Africa has already begun this process. In this regard it is believed that already more than 50% of food products supplied locally in South Africa, are traded via a modern market value chain. This involves, amongst others, shorter supply chains, and farmers dealing directly with supermarkets as opposed to working through traditional public markets (Weatherspoon & Reardon 2003; Sautier et al. 2006; Louw et al. 2006). Specialised agro-processing firms have been established, and the once tightly regulated agricultural industries of South Africa,

have been “freed up” through the abolishment of the agricultural marketing control boards (Fenyes et al. 1998).

However, despite these signs of *industrialisation* and *progression* of agriculture and agri-food markets in South Africa, most farmers are struggling to be competitive and to gain access to markets. This is due to constraints relating to their farm size, available equipment and technology, experience or other requirements of markets. As a result there is a need to identify solutions that will link emerging, “unindustrialised” farmers to “industrialised” markets with the aim of “industrialising” these farmers in the longer term.

In her study regarding the industrialisation of small African enterprises, McCormick (1999) highlighted the importance of facilities and infrastructure, as well as the access that small firms have to these facilities, as the most critical elements for growth (and even business survival). This correlates to the findings of local studies by De Wet (2004) and Louw (2006) regarding the involvement of small farmers in the mainstream economy of the country. In these studies, it was found that one of the main reasons why small farmers cannot access formal markets is because of their lack of access to the services required to improve the quality of their products, to prepare their products for the market, and to transport their products to the market. In order to serve a specific market, the agri-food industry, like any other industry, requires services (water, electricity, road and transport network etc.), equipment (processing equipment, cold rooms etc.) as well as the infrastructure to houses these components.

McCormick’s (1999) view of industrialisation within a small African firm (or developing nation) context, consists of:

- The improvement of producer’s access to markets;
- Offering an environment in which joint action could take place;
- The specialisation and differentiation of firms which eventually leads to greater efficiency;
- The diversification of size structures and inter-firm linkages to include wider national and global markets.

According to McCormick's (1999) view, the development, improvement and provision of services, infrastructure, equipment and technology (like the ones mentioned above) can thus be seen as the industrialisation of an industry.

McCormick (1999) argues that small firms in developing economies reach a stage where *industrialisation* is required for further growth. Elsewhere, the importance and relation of clustering, industrialisation and growth of small firms was investigated by Schmitz & Nadvi (1999), and a differentiation was made between the early stages and the more advanced stages of industrialisation in developing countries. The question of whether (and during which circumstances) the clustering of firms would assist the industrialisation and upgrade of an industry, were also investigated.

utilise

Schmitz & Nadvi are of the opinion that two things are required for industrialisation: The mobilisation of unexploited resources (financial and human), and the effective use of previously underutilised resources. According to their findings, clustering as a strategy to facilitate this mobilisation is very effective. Effective investments in small steps are possible in clusters, and individual firms do not have to own their own equipment to be involved for the entire process of their value chain. Furthermore, the working capital required in clusters of firms is often less than for individual firms – for instance, there would be no need to store inputs and raw materials when specialised suppliers are nearby and linked to the cluster. Joint action between small firms also reduces the amount of risk that each individual firm needs to take, since risk is shared and each firm is thus only exposed to "small and calculable risks rather than large and wild risks" (Schmitz & Nadvi 1999, p.1506).

It has been said that the greater efficiency and productivity gained through industrialisation, technical and organisational change are the building blocks for improving competitiveness in a sector (McCormick 1999; Sartorius & Kirsten 2004). However, the industrialisation of agriculture in developed countries has sometimes been accused of causing the restructuring of agricultural supply structures and marginalising small farmers to ensure continuity of supply and economies of scale (Sartorius & Kirsten 2004). It should therefore be highlighted that, although it seems as if a degree of industrialisation and organisational structuring (or formalisation) would be required in the small farming sector as part of a strategy or

framework for improved competitiveness, special care should be taken not to marginalise small and resource poor farmers in the process. Although the dangers of the marginalisation of small firms competing in an industry dominated by big participants (with economy of scale advantages) are real, small firms do have better growth and employment potential under certain conditions in clusters, which vary between different industries and countries (Schmitz 1995).

It can be argued that the industrialisation of the agricultural sector implies the increasing of economies of scale by consolidating small farms into big, consolidated production units (as per *The Earth and Environmental Sciences Department of the University of Adelaide, Australia's* definition of the industrialisation). This would be an option for creating a competitive advantage, but it would also result in significant social impacts, such as the marginalisation of small farmers, the decrease of small businesses, and a potential decrease in employment opportunities. It is suggested that a clustered approach, where individual small farmers are organised within an integrated value chain, would be a more suitable option, since this option would allow individual small farmers to continue with their operations without being swallowed by a big, macro organisation.

The conclusion drawn from the discussion above is that industrialisation is a critical component towards the improved competitiveness of an industry or firm competing in a modern economy. The key success factors of agri-industrialisation of small-scale farming, taken from the analysis of literature, can be summarised as follows:

- The mobilisation of unexploited or underutilised resources;
- The transformation of traditional production handling and distribution processes into more productive and efficient ones;
- Value addition and agro-processing of products to create an increased range of products (diversification);
- Increased vertical integration between suppliers and buyers, and specialisation of individuals within the supply chain to improve efficiency and access to modern inputs and markets;

- Expanding small-scale operations to gain economies of scale by creating an environment and driver for the clustering and collective action of individual farmers, thereby reducing the risks of individual farmers, and creating improved access to markets;
- The creation or provision of modern facilities and infrastructure to enable the above.

The characteristics and requirements of industrialisation seem very difficult to obtain by individual small farmers, but the above key success factors propose *clustering* or *joint action* as a potential strategy for the *industrialisation* (growth and improved efficiency) of small, low technology farming enterprises.

Clustering will be discussed in more detail in the following section, with the aim of including it as a component the Framework for improved competitiveness of small farmers.

3.3 Clusters: background, definitions and benefits

As mentioned before, the concept of clustering for creating competitiveness in industries has been widely studied over the past few years – to such an extent that the term “cluster” has become one of the most common nouns used to refer to the grouping, networking or co-operation between firms for collective action towards improved competitiveness. Some scholars even believe that economic success cannot be achieved in a global economy without the clustering of firms (Pitelis et al. 2006).

Some of the relevant views and definitions of clusters include:

- *A cluster is defined as a sectoral and geographical concentration of enterprises…..Once such a concentration exists, however, external economies are likely to arise, notably from the emergence of suppliers who provide raw materials and components, new or second-hand machinery and spare parts; or the emergence of a pool of wage workers with sector specific skills. A cluster may also attract agents who sell to distant markets and favour the emergence of specialized services in technical, financial and accounting matters* (Humphrey & Shmitz 1996)*;*

- *Clusters are geographic concentrations of interconnected companies and institutions in a particular field. Clusters encompass an array of linked industries and other entities important to competition. They include, for example, suppliers of specialised inputs such as components, machinery, and services, and providers of specialised infrastructure. Clusters also often extend downstream to channels and customers and laterally to manufacturers of complementary products and to companies in industries related by skills, technologies, or common inputs. Finally, many clusters include governmental and other institutions, such as universities, standards-setting agencies, think tanks, vocational training providers, and trade associations that provide specialised training, education, information, research, and technical support* (Porter 1998)*;*
- *…clusters are firm agglomerations, usually with a geographical dimension, with horizontal and (preferably also) vertical intra- and (preferably) inter-sectoral linkages in the context of a facilitatory socio-institutional setting, which co-operate and compete in (inter)national markets.* (Pitelis et al. 2006);
- *…clusters (are) concentrations of firms or businesses that are located in relative close proximity, compete with each other in similar markets, co-operate to enhance technical skills and market access, and support growth and development of individual businesses through social networks (The small firms industry cluster project, 2005).*

From the definitions and views given above, clustering can be seen as the grouping of firms that are in close proximity to one another, and which co-operate for a common goal, linking their businesses with specialist suppliers, service providers and markets for improved inputs and more secure markets.

Michael E. Porter is seen as one of the experts in terms of clusters[16]. His view on the benefits of clusters is summarised in the extract of one of his works below:

> *Clusters not only reduce the transaction costs and boost efficiency but also improve incentives and create collective assets in the form of information, specialised institutions, and reputation amongst others… More importantly, clusters enable innovation and speed [up] productivity growth. (Porter 1998, xii)*

[16] Based on the number of references made to his work and definitions by other scholars of clusters

Porter (1998) further motivates clusters by describing its effect on competition in an industry in the following three ways:

- Clusters increase the overall, as well as the individual productivity of the particular industry and enterprise;
- Clusters drive the direction and pace of innovation;
- Clusters stimulate the formation of new business within the industry.

Porter continues by stating that *clustering* could be seen as an alternative way of organising a value chain – instead of transactions between different buyers and sellers, the close proximity of enterprises and the repeated transactions and exchange of services or goods establish better co-ordination and trust between firms:

> "*A cluster of independent and informally linked companies and institutions represents a robust organizational form that offers advantages in efficiency, effectiveness, and flexibility*." (Porter 1998, p80)

In their discussion of agri-food chains and networks for the development of this sector, Ruben, Slingerland & Nijhoff explain that the main advantages regarding clusters of firms in the agricultural sector entail the economies of scale and scope that are created, as well as the agglomeration effects that permit lower transaction costs for small and developing firms. According to them, "clusters…create external economies and reinforce collective efficiency through collective action in areas of mutual interest." (p 6, 2006)

In Altenburg & Meyer-Stamer's (1999) review of cluster experiences in Latin America, three different types (which could also be seen as different stages) of clusters are identified. These include survival clusters of micro- and small-scale enterprises, more advanced clusters of differentiated mass producers, and clusters of international corporations and their nearby suppliers. The first type (survival clusters of micro and small-scale enterprises) is the most appropriate and fitting one for this study when considering the current state of the

small-scale agricultural sector. However, no matter the type or stage a business or business sector might be in, clustering remains particularly relevant during in assisting small enterprises to grow in “riskable” steps. (Schmitz and Nadvi, 1999)

With the abovementioned discussion regarding clustering serving as a background, the following section will now deal with the different forms of clusters, as well as different scholars' views and opinions surrounding clustering as a strategy for growth among small scale and resource poor firms.

3.4 Cluster theory and models

In their study regarding theoretical models that address competitiveness in the agri-food sector, Neven & Dröge (2001) strengthen the case of clustering being a relevant and appropriate strategy for improving the competitiveness of small firms. Their study focuses on three different models or theories for analysing clusters and their potential contribution towards the competitiveness of small firms, specifically within the agri-food industries in developing countries. These three theories (*flexible specialisation*, *collective efficiency* and *the diamond of competitiveness)* will be used as a starting point for the investigation into appropriate clustering analysis models for the resource poor agricultural sector. The fundamentals of these theories, the views of different scholars on these theories, as well as their findings and results from different implementations of these theories are discussed during the rest of this chapter. The aim of these investigations and discussions is to determine key success factors of clustered firms, and to identify a proposed procedure to analyse the potential of clustering small farmers for improved competitiveness through collective action.

3.4.1 Flexible specialisation

As suggested by the name, *flexible specialisation* implies that smaller, (thus) more flexible firms, should be able to outperform big, mass manufacturing firms either in certain markets, certain stages of a market or with certain products (Neven and Dröge, 2001). According to

their interpretation, other characteristics of a *flexible specialisation* firm include "product innovations" and "quick following of the consumer" (p 5).

Wikipedia's version of the history of flexible specialisation states that changes in the international economy around the early 1970's bought about a change from predominantly *mass production* firms to more flexible and specialised firms. Instead of generic, mass produced goods, profits began to lie in diversification of product lines, thereby aiming to reach and satisfy a wider consumer market (http://wikipedia/flexiblespecialization.htm).

The Just in Time (JIT) system is an example of a flexible approach to manufacturing, where a number of different manufacturers are part of the value chain of say a motor vehicle, with each one specialising in a certain part of the vehicle. The different parts arrive at the assembly line "just in time". The fact that each firm specialises in the manufacturing of only a specific part (or range of parts) decreases the overall cost and time required on the assembly line. JIT also results in less defects, quicker assembly time (because of specialised and experienced personnel and equipment), less inventory space required (thus less infrastructure required) and less time wastage, since everything arrives at the right place at the right time without having to be stored somewhere on site.

3.4.2 Collective efficiency

> *"In the development milieu, (researchers, practitioners, consultants, funding institutions…), collective efficiency is considered as a key success condition, especially in Southern countries for agricultural and rural development projects."* (Assouline 1998)

Collective efficiency is the concept for competitive advantage that is derived from *local external economies* and *joint action* (Schmitz 1995). In his investigation regarding collective efficiency (due to clustering) as a potential growth path for small-scale industry, Schmitz argues that external economies and joint action (or co-operation) are both important for growth within an industry. Furthermore, he suggests that the co-operation of small firms creates an efficiency that often surpasses that of bigger individual firms.

Assouline, who is of the opinion that collective efficiency should be considered as a key success factor for developmental projects, observed that, in order for small firms (including farming activities) to develop in a sustainable manner, their collective efficiency needs to be strengthened (Assouline 1998). This could be done by strengthening the productive relationship between small firms, by organising the collective utilisation of equipment and services for improved efficiency, and through the specialisation of firms according to the skills and competitiveness of each individual enterprise.

Nadvi (1996) and Schmitz & Nadvi (1999) refer to two different types of collective efficiency that are created by the clustering of firms. Active collective efficiency is the result of the collaboration of firms that take part in a cluster, while passive collective efficiency are benefits and gains that are created due to external factors (in other words not created by the joint action of the participating firms). The environment in which a cluster is situated therefore plays a role in the cluster's success, and the importance and potential of external factors should therefore not be disregarded.

According to Schmitz's (1995) study, two external role players in a cluster play an important role towards growth and success. They include the public institution (co-ordinating and organising events, media and communication towards all participants of the cluster), as well as marketing agents who establish linkages between trade products from the cluster to a demand in a market. This view correlates with a key pattern that was evident in 38 international case studies of the inclusion of small farmers in dynamic markets. The collective conclusion of the case studies was that all the successful projects shared "collaborative arrangements between trained and organised farmers, a receptive business sector and conductive public policies and programmes" (Berdegué et al. 2008, p.10).

Three components therefore play a role in the success of small farmer projects, namely the farmers themselves, the business sector and the public sector (Government). A further key success factor, noted by Berdegué, Biénabe & Peppelenbos (2008), is the support of specialised partnership facilitators (or co-ordinators) to organise the arrangement and the different agents. This concept of facilitating the three important components is illustrated in Figure 3.1.

Figure 3.1 Keys to the successful inclusion of smallholder farmers in dynamic markets
(source: Berdegué, Biénabe & Peppelenbos 2008)

In order to delve deeper into collective efficiency, three scholars' views on this subject are discussed in the rest of this section.

3.4.2.1 Van Rooyen's view on collective efficiency

The first instance of collective action being practiced in an industry could well have been within the co-operative environment of the agricultural sector. The phenomenon of farmers working together for their satisfaction, in accordance with certain principles, rules and practices, has been referred to as early as 3100 B.C. (Van Niekerk 1988)

Agricultural co-operations or farmers' organisations have been part of the South African agricultural sector for more than 100 years (the first co-operative was established in 1892) (Van Niekerk 1988). The main tasks and objectives of South African agricultural co-operatives (past and present) include (as summarised by Nieuwoudt in Van Rooyen (1998b)):

- Acting as agents in purchasing inputs and infrastructure;
- The marketing of products and marketing development;

- The processing and value adding of products;
- Providing financial support, extension services and insurance;
- Providing technical-economic information;
- Reducing risks of members by introducing pool pricing schemes;
- Enabling access to improved technologies and communication systems;
- Providing a strong, consolidated lobby for commercial farming interest within organised agriculture;
- Creating economies of scale for most of the above activities.

Although a thorough discussion of the workings of an agricultural co-operative is beyond the scope of this study, it is interesting to note that a vehicle that promotes "collective efficiency" in the agricultural sector already exists, and that its main functions are to address some of the constraints that resource poor farmers have to face. A logical question would therefore be as to why co-operatives for resource poor farmers have not been established and promoted before. In this regard Van Niekerk (1988) notes that agricultural co-operatives did exist among resource poor farmers in the less developed areas of South Africa during the 1980's and 1990's, but that most of them disbanded as a result of a lack of management experience, inadequate capital resources, disloyalty of members and non-performance by government agencies.

Despite previous failures of co-operatives for resource poor farmers in South Africa, Van Rooyen (1998b) still believes that co-operatives are endowed with the necessary properties needed to act as a development agency for the mobilisation of resource poor farmers in South Africa. Others (see for instance Carney & Van Rooyen (1998)) agree that creating improved efficiency though collective action is the most logical route towards the empowerment of resource poor farmers. However, traditional co-operative structures seem to have a negative connection in the agricultural sector of South Africa, possibly due to the numerous failures in the less developed parts of the country (see for instance Van Rooyen (1998b)).

Van Rooyen defines a co-operative as a "formal (legal, structured and constituted) collective bargaining action by an interest group (the members) to serve their business and economic interest" (p 223, 1998b). He extends this definition with the views on modern co-operative theory as "collective action", "a coalition of member interests", and as a contract between individual members, their representatives on the boards of directors and the managers to achieve an agreed upon set of objectives."

In essence, although co-operatives and co-operative theory come with a host of legislation, acts, laws and regulations (of which a thorough review is given by Van Niekerk 1988), it should be seen as a tool or organisation which provides farmers with management assistance and guidance, information, infrastructure and inputs. Through co-operatives, farmers can gain an advantage through collective action, whether it be farming collectively (i.e. sharing equipment and procuring inputs collectively to increase bargaining power) or marketing collectively (producing and trading produce under one name to increase economies of scale and bargaining power with buyers).

3.4.2.2 Humphrey and Schmitz' view on collective efficiency

In their analysis of the success of small firms in Europe and developing countries, Humphrey and Schmitz (1996) argue that co-operation and clustering of small firms increase the competitiveness of small and medium enterprises. They conclude that a customer-orientated, collective and cumulative approach (or a "Triple C" approach) should be followed in the following manner in order to promote clustering and networking of small firms:

- Focus and public support for small firms and groups of firms should be from a demand perspective (customer-orientated) as opposed to a supply perspective – in other words, more attention should be given to providing marketing assistance, markets, fairs, open days and other methods of linking small enterprises;

- Customer-orientated and collective support for groups of small firms can achieve cumulative improvements in the competitiveness of these firms;
- Additional benefits for co-operating firms (as noted by Humphrey and Schmitz) include the fact that it provides a conduit for cost-efficient assistance to small firms (through either public or private funding), which in turn lowers overall transaction costs by providing assistance to a collective group as opposed to individual firms.

In their study, Humphrey and Schmitz also found that groups of small firms gained a competitive advantage over larger firms by supplying niche markets with exacting standards, with special attention to quality, design, speed of innovation and speed of response. Further findings related to their *Triple C approach* for small firms can be summarised as follows:

- Small firms can pay more attention to the quality and the design of their final product, as opposed to the volume of the final product – a situation that enables the supply of products to niche markets. Niche markets provide these firms with higher financial returns per final product on a lower volume of products, exempting them from trying to reach high volumes and high turnovers;
- Smaller firms usually have smaller management, and in some cases decisions can be made immediately by the responsible party, which results in faster responses to market signals and requirements from buyers;
- Smaller firms in co-operation can assist one another to supply markets and "big buyers". For example, it might happen that a firm is not able to fulfil an order from a big client, but because the produce of the firms are similar, produce can be bought in from another firm in order to honour the contract with the buyer.

  In agriculture and the food industry this is especially valuable, since buyers and consumers ideally would want access to the whole spectrum of fruit and vegetables for the entire year, even though in most cases the supply season of one particular farmer is typically only a few months of the year. In a sense the high risk involved with agriculture (because of the uncertainty of weather

and markets) is also managed when farmers co-operate to supply a market collectively, as opposed to individually (the risk is shared and the potential impact on each individual farmer thus lowered);

- The clustering of small firms results in collective efficiency, which, over time, allows small firms and their employees to specialise and attract suppliers and buyers.

The *Triple C approach* suggests that small and medium enterprises (SME's) should not be at a disadvantage at all when compared to large firms, as long as they are able to benefit from the advantages of clustering and joint action.

3.4.2.3 McCormick's views on collective efficiency

According to McCormick's study (1999, p.1531), three characteristics of clustering specifically assist small firms in obtaining economic growth:

- *Clustering gives rise to collective efficiency, which enhances a firm's competitive advantage;*
- *Clustering facilitates growth in small steps, making it more sustainable;*
- *Clustering makes it easier for small firms to respond to opportunities and crises.*

McCormick argues that collective efficiency is created through clustering, and suggests that these two terms can therefore be used interchangeably. McCormick also highlights numerous benefits of clustering out of an African context that surfaced during her studies. These are relevant to the sector under investigation:

- *Clusters improve market access for small firms, and in the process also allow firms to increase production*. Most big buyers of agricultural produce, especially the supermarket groups, require a continuous supply of a minimum value of fresh produce from a farmer before they consider him as a supplier

(P. Van Zyl 2007). Joint action between farmers creates the opportunity to supply these volumes to big buyers, and once a supply contract has been secured, the farmer has a market for his products and can increase production with less risk;

- *Clusters improve the potential for technological upgrades between firms, and in the sector in general, by creating a platform for Government and other institutions to provide infrastructure for higher technologies.* This conclusion correlates with Humphrey and Schmitz's comment regarding the clustering of firms providing a conduit for better support to resource poor firms;
- *Clusters encourage joint action, which could help small firms to deal with external shocks.* Even though McCormick refers mostly to non-perishable product sectors in her analysis, the statement also rings true for exporting firms that trade in high value agri-food products with a very limited shelf life. Since there is a relatively small market for very high quality fruit and vegetable products in South Africa, based on the relatively low income and disposable income per household (Van Deventer 2006), Western markets (mostly Europe and North America) is the preferred marketing channel for these products. Changes in exchange rates, demands, transport routes and available timeslots, product specifications and even packaging requirements can result in non-compliance to export contract requirements – something that can ruin a small firm. However, the “virtual” economies of scale that are created by co-operating firms can result in less risk having to be faced than that of a small firm competing in a global market, and can therefore assist in dealing with changes in demands more effectively;
- *Clusters enable firms to make good use of relatively small amounts of resources.* Small-scale, co-operating firms can share equipment and infrastructure, and in effect, intensive capital investments are optimally utilised, subject to good organisation and communication between the firms.

McCormick’s case studies and results regarding the clustering of small firms in Africa substantiate the postulation that, through clustering, small firms create a collective efficiency that can serve as a strategy for overcoming the many obstacles small firms have to face. Although the sectors studied by McCormick do not focus on

horticulture, the results of her study are topical since they apply clustering theory and collective efficiency in an African (resource poor) economic context.

3.4.3 Porter's Diamond of competitiveness

According to Neven and Dröge's (2001) assessment of the three previously discussed theoretical models for studying the co-operation of clustered small enterprises in the agri-food sector, Porter's *diamond model of competitiveness* (as per Porter 1990) has been identified as one of the most appropriate models for analysing clusters in this sector. Even though Porter's work is mainly based on global or international competition, "many of the principles are the same whether competition is domestic or international" (Porter 1990, p 33). As a result it is a fitting model for inclusion in this study. The key points thereof, as well as other related work from Porter regarding competitive advantage, are discussed in this section.

In much the same way as Humphrey & Schmitz (1996), Porter refers to two different aspects that contribute to a firm's success, namely external and internal economies. Internal economies refer to the firm's value chain structure (as discussed in chapter two), while external economies refer to the environment in which the firms operates, which is shaped by the determinants as explained in the diamond of competitiveness model.

Porter describes the success of a particular sector in an international context by arguing that, although certain nations have gained a competitive advantage over others in certain sectors, it is individual firms that compete, not nations. The competitive advantage of an individual enterprise, as described earlier in this study, is developed through the way in which the enterprise organises and performs discrete activities in the value chain. Over and above the organisation of an enterprise's value chain – which constitute the internal economies that influence a firm's competitiveness – the environment in which it functions and operates can also contribute towards its success or failure. Porter illustrates the main attributes that play a role within the environment in which a firm competes with other firms (locally or internationally) in his *diamond of competitiveness model* (Figure 3.2). These include:

- ***Factor conditions*** – the nation's or industry's factors that are relevant to production;
- ***Demand conditions*** – the local demand for products or services that are produced by the industry;
- ***Related and supporting industries*** – the presence, quality and competitiveness of suppliers and related industries;
- ***Firm strategy, structure, and rivalry*** – the way companies are created, organised and managed in the nation and industry, as well as the nature of rivalry within the industry;
- ***The role of Government*** – the influence of policies and regulation on the business environment of the industry;
- ***The role of chance*** – the events outside the control of firms, which include phenomena such as pure inventions, breakthroughs in basic technology, wars, external political developments, and major shifts in foreign market demand.

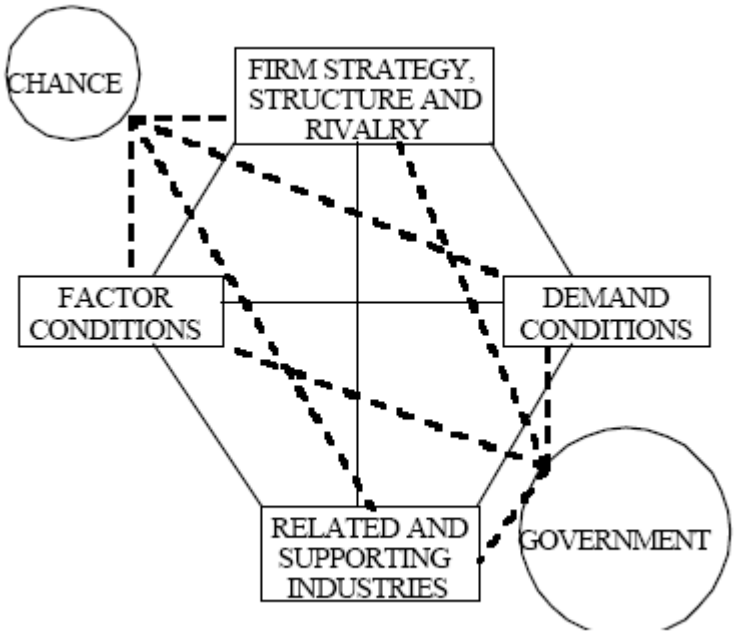


Figure 3.2 The diamond of competitiveness
(Source: Porter 1990)

In an attempt to define the determinants of competitiveness of South African agriculture in the agro-food and fibre complex industries, Esterhuizen, Van Rooyen and D' Haese (no date) – with the assistance of Porter's model – identified the major factors that influence this

sector. These are listed in Table 3.1 overleaf. Although the determinants in Table 3.1 were developed for the South African agricultural industry as a whole, and not for the competitiveness of individual farmers, it provides a good indication of the factors that should be analysed towards the development of a strategy for improved competitiveness of small farmers.

Table 3.1 The major determinants of the competitiveness of South African Agriculture
(adapted from Esterhuizen et al. no date)

Production factors	Demand conditions	Related and supporting industries	Firm strategy	Government support	Chance
Cost of production • Cost, quality and availability of unskilled labour • Cost, quality and availability of skilled labour • Administration costs associated with labour matters Natural resources • Quality • Availability Location Capital • Cost • Availability Knowledge • Cost • Quality • Availability Infrastructure and technology • Cost • Quality • Availability	Market size Market information • Quality • Availability • Cost Quality of products Market growth	Financial institutions Research institutions Transport companies Suppliers of packaging material Electricity suppliers Agricultural suppliers • Competitiveness • Sustainability • Linkage Related industries	Adaptability Culture Structure Flexibility Pricing structure Managerial capabilities Market power of suppliers Market power of buyers Threat of substitutes Threat of new entrants	Indirect support Trade policy Land reform policy Labour policy Fiscal policy	Economic stability Aids Political stability Price stability Crime

3.5 Conclusion on cluster theory and relevance

The potential benefits of clustering and co-operation between small farmers with regards to improved competitiveness are clear from the preceding discussions. Clustering has the potential to:

- Provide a conduit for cost effective assistance to small firms;
- Create a mechanism for the optimum utilisation of capital intensive assets;
- Facilitate growth in small and manageable steps by incorporating more small firms as and when required;
- Reduce the impact of external shocks;
- Enable and promote specialisation;
- Diversify and increase productivity of small firms;
- Improve market access through increased volumes and increased economies of scale.

Three theoretical models that could potentially be used to analyse the resource poor agricultural sector as part of a framework for improved competitiveness, have been discussed in this chapter up until now. All three have been applied successfully in other sectors and industries (mainly manufacturing), with two of them displaying the necessary appropriateness for use in the context of this study.

Although the three main characteristics of flexible specialisation (flexible manufacturing, product innovativeness and "quickly following the consumer") hold merit as key success criteria for small manufacturing firms competing with larger, mass production manufacturing firms, they do not necessarily represent natural components of a strategy for improving the current state of the emerging farming sector in South Africa. Neven and Dröge themselves (2001, p 9) believe that, out of the three models, flexible specialisation is not very applicable for small firms in developing areas or countries. Therefore, even though flexible specialisation (for instance the JIT system) could work well in the manufacturing industry, and despite Neven and Dröge's choice of clustering models that relate best to the agri-food

industry containing Piore and Sable's *flexible specialisation framework*, this model's key construction components do not seem to be suitable for this study.

In terms of the other two models investigated, namely *collective efficiency gained through clustering* and Porter's *diamond of competitiveness* model, the following key points are highlighted based on their relevancy for the development of a framework for improved competitiveness:

- The clustering of small firms should "begin with the end in mind" – the drive to establish increased production, differentiation or specialisation through co-operation of firms should be preceded with the identification of the market's (the buying customer's) needs. The end-market is thus a critical component in the process of analysing a group of potentially "clustered" entities to improve competitiveness;
- The six components of the *diamond of competitiveness* (factor conditions, demand conditions, supporting industries, firm strategy, structure and rivalry, the role of Government and the role of chance) should be analysed to determine the environment in which activities take place. It is highly unlikely that all components of the *diamond* should be favourable – the *diamond* should provide guidance on where the most likely focus areas should be for improved competitiveness within the current environment. A framework with determinants for agricultural competitiveness within a South African context is provided as part of this document from an analysis done in a previous study;
- The agricultural co-operative could be the most logical vehicle through which collective action between farmers could be reached. However, special attention should be given to the management and leadership of the co-operative, the capital resources, the loyalty and commitment of the members and the performance of stakeholders, especially in the case of resource poor and inexperienced farmers;
- Other key success factors (which were determined during the literature study) that clustering could potentially offer towards improving the competitiveness of small firms, include the following:
    - Relationships between producers, suppliers and buyers can be strengthened through clustering, which can result in improvements in win-win negotiations between suppliers and buyers;

- The management of smaller firms are easier than the management of macro firms;
- The clustering of small firms provides the opportunity for the specialisation of firms;
- Clustering of small firms provide improved market access;
- The clustering of firms enable the better utilisation of limited resources;
- Clustering provides the opportunity for small firms to focus on the provision of smaller volumes of higher quality or niche products to niche markets.

In order to confirm the key success factors that have been identified and discussed above, and to determine additional insight and potential key success factors from collective action theory, practical examples of clustering and collective action by small farmers in developing economies are discussed in the following section.

3.6 Relevant case studies of competitiveness in the small-scale agricultural sector

In this section different approaches and strategies regarding the linkage of small farmers with markets, that have been successfully implemented, are discussed as case studies, with the aim of identifying common key success factors for improved competitiveness. Six case studies are briefly discussed, including:

- The organisation of Ukrainian small farmers;
- The procurement strategy of the Thohoyandou Spar;
- Four agricultural co-operative initiatives, one each from China, Guatemala, Hungary and Kenya.

The Ukranian and South African case studies will be discussed in detail, while the rest will be discussed in an abbreviated form.

3.6.1 The organisation of Ukrainian small farmers

A large portion of the Ukrainian horticultural supply chain consists of “small” (five to fifty hectares in size) and “household plot” (less than five hectares in size) farming units. Interestingly, similar to the current situation in South African agriculture, most of these small farmers obtained land as a result of a land distribution programme that was commissioned in 1991 (Lee 2006). However, in contrast to the dominant force within South African agriculture (namely large, commercial, private farming units), the previous farming system in the Ukraine was a collective co-operative system.

Although the challenge created by the privatisation of the former collective systems was unique to the previously communist regime in the country, a few of the constraints “new” private farmers had to face do in fact correlate with the findings regarding constraints facing local small farmers in South Africa. Some of these challenges created by the new system, as given by (Lee 2006), include:

- The lack of systems and infrastructure to support private farming (no extension advisory assistance, poor storage, transportation and handling facilities);
- The lack of relevant market information, including market prices and buyers’ requirements and demands;
- Limited competitive market opportunities in the farmers’ local regions, forcing them to rely on wholesalers or middlemen for trading their produce;
- Little experience in private co-operative setups, and a lack of trust between farmers to organise into private farmers associations;
- The lack of effectively organised and well run wholesale markets;
- Limited access to credit and insurance service;
- The lack of land markets that provide clear value for the land owned asset.

In order to address the abovementioned constraints facing small farmers, an approach for creating formal and informal linkages to processors, wholesalers and retail markets was followed. It is called the Agricultural Marketing Project (AMP). Similar to the focus area of this study, the focus of the AMP was on small and medium sized horticultural farmers that

had minimal support infrastructure and weak market linkages. The AMP's strategy to improve market access and competitiveness of small farmers consisted of four components: *commercial farming, market development, producer association/organisation and a market information system.* Some of the key applicable tasks, activities and responsibilities of the various components are listed below:

Commercial farming unit:

- The scheduling of farmer open days, where demo plot presentations are done by input supply firms to demonstrate new technologies, cultivars, production methods, etc;
- The scheduling and organisation of seminars and workshops to provide training and to provide farmers with information, including explanations and workshops on the value chain and discussions on what buyers require from farmers;
- The preparation and distribution of pamphlets at training events to provide information to farmers;
- The provision of assistance to farmers in terms of farm business models to assist in management and planning, and to obtain loans from banking institutions.

Market development unit:

- The implementation of supply chain management, product marketing and merchandise practices through linking farmers to wholesalers, processors and retailers, often in the form of supply contracts;
- The scheduling and organisation of seminars and workshops to provide feedback on the needs of different buyers in terms of produce quality, contract terms and conditions, emerging trade practices, trends of businesses and other needs that could strengthen linkages between farmers and buyers;
- The preparation and provision of post-harvest handling information to farmers, wholesalers, processors and retailers, including the demonstration thereof on field days to provide best practice information regarding washing, sorting, grading, packing, cooling, storage and other activities;
- The preparation and distribution of pamphlets regarding the results of market surveys, preferences and trends;

- The scheduling and organisation of highly focused study tours for leaders in specific business activities to expose them to the latest technologies, marketing practices and produce business strategies.

Producer association/organisation

- The identification and establishment of farmer groups by bringing farmers together to build business organisations;
- The scheduling and organisation of seminars and workgroups to build farmer groups and to provide training in terms of organisational structures, management, roles and responsibilities of board members and how to recruit new members;
- The development of a sponsor association and co-operative assistance programme to assist organisations with building relationships with farmers, government agencies and other organisations;
- The sourcing and implementation of small grants to introduce new technologies and practices at different stages of the supply chain;
- The monitoring of progress of associations/co-operatives and grant recipients to ensure that problems encountered can be resolved as soon as possible.

The Market Information System team

- The provision of technical and marketing ideas, market news, price information, commodity forecasts and purchase/sale opportunities with regards to national markets.

The abovementioned information and inputs, provided to farmers in the Ukraine by the AMP and its respective components, had a positive impact on small farmers. The programme managed to provide services to small farmers to such an extent that it resulted in the removal of barriers preventing participation in formal marketing. The AMP also managed to improve the competitiveness of small-scale agriculture in Ukraine in terms of earnable revenue – to such an extent that for every $1 spent on the AMP, the result was a return of $12 of fresh produce sales from small farmer products (Lee 2006).

The Ukrainian small farmer strategy and the AMP programme that was developed appears to be an appropriate solution for the South African environment. However, Lee cautions that certain pre-conditions were vital for success during the implementation of the AMP programme. These include:

- An educated and trained labour force;
- Motivated, trainable, hard working farmers;
- Good, open-minded management of wholesalers, processors and retailers;
- A basic transport infrastructure;
- A government willing to let participants in the system expand and operate in a private sector manner, without interfering unnecessarily;
- Support from input supply companies that see opportunities for their businesses;
- A local market of critical size to support development without dependence on export markets.

The above prerequisites should be noted if the key success factors of this strategy, which were identified earlier in this section, are to become part of a strategy for implementation in South Africa.

3.6.2 The Thohoyandou Spar's procurement strategy

The fresh produce procurement strategy that was followed by a particular supermarket in a rural community in South Africa, is an example of the successful implementation of an empowerment strategy to incorporate small farmers competitively into the mainstream economy. Although almost no public intervention or assistance was directly provided in this instance, it represents an extreme case that was successful mainly due to the rural and remote nature of the region (Berdegué et al. 2008). However, it is still worth while to identify the key success factors that made this particular strategy successful.

When the Spar in Thohoyandou in the Limpopo province of South Africa opened in 2002, the local Shoprite, which had 70% retail market share, dominated the market. However, after only two years of operation, the new Spar had accumulated a dominant market share of 66%, while the previously dominant Shoprite had fallen to a 28% market share (Louw et al. 2006). Even though the new Spar had increased the volume of retail in Thohoyandou, which had an impact on the market share calculation, the improvement in market share could be attributed mainly to their procurement strategy, which benefited both the retailer and the farmers that were supplying the store. The new retailer placed an emphasis on procuring fresh produce from poor, local producers in the area (Louw et al. 2006) who had previously been excluded from supermarket procurement due to constraints such as those mentioned in §1.4.2.

The strategy followed by the Spar, in order to improve the ability of small farmers to supply the shop with fresh produce, is briefly discussed below (as taken from Louw, H. Vermeulen & Madevu (2006)):

- The Spar focussed on addressing the needs of the local emerging market. A market study revealed that fresh fruit and vegetables were not being offered by the other shops in town on a daily basis (probably due to their procurement systems which required them to procure their fresh produce from a distribution centre situated a few hundred kilometres away from Thohoyandou). One of the Spar's objectives was to provide fresh produce on a daily basis in order to attract customers;
- The above objective was achieved by the Spar through structuring their procurement policy in such a way that fresh produce was sourced locally as much as possible;
- Community involvement was valued by the Spar – for instance, the supermarket agreed not to trade in two of the locally produced and popular commodities of the area (tomatoes and mangos), which allowed informal traders to trade in these lines, thereby creating opportunities for local economic development;
- The supermarket not only provided an end market for the small producers, but also provided essential inputs and services required by these farmers, including:
    - Interest-free loans upon the presentation of a business plan;
    - Frequent farm visits by Spar personnel to monitor crops and to advise on methods and inputs;
    - Requesting progress reports from the farmers to enable Spar personnel to assist with the management and planning;

- Training and assistance in terms of product quality standards and handling methods;
- A virtually unlimited market for the farmers' fresh produce based on verbal contracts and a strong trust component.

By implementing the abovementioned strategies, emerging farmers were able to supply approximately 30% of the supermarket's fresh produce. Although the strategy increased the administration and transaction costs of the supermarket, and despite the production quality of the small farmers not being up to standard at first, the costs and efforts were more than justified because of the following positive outcomes:

- The incorporation of small farmers increased the volumes and frequency at which the retailer could procure fresh produce;
- The incorporation of small farmers' produce increased the store's market share;
- The local economic development that was created through this venture (resulting in more disposable income to spend at the supermarket);
- The buy-in and support from the community due to this programme increased the supermarket's sales.

The supermarket's strategy of addressing the needs of the local small farmers, and the fresh produce requirements of the local community (customers), contributed towards an average daily customer base of more than 22 500 people. It also resulted in the following daily sales of fresh produce:

- More than 3 700 heads of cabbages
- More than 1 500 bunches of spinach
- More than 1 500 bunches of beetroot
- More than 2 700 bunches of carrots
- More than 4 000 apple pre-pack bags

By analysing the abovementioned product range, another strategy of the supermarket becomes evident. The product range represents a major component of the basket of low income households' fresh produce diets (together with potatoes, onions, butternuts and bananas, see De Wet (2004)). The fact that no value has been attached to these products (all are bunches, not pre-cut or packed, except in the case of the pre-packed apples) indicates a strategy to provide low cost (affordable) food to the customers – food that can be supplied by small-scale, resource poor farmers, even without access to post-harvest handling or value adding equipment.

The Spar's strategy enabled 27 small farmers to make a living from supplying fresh produce to the supermarket on a frequent basis. This case study proves that procurement from emerging farmers in South Africa is possible when a strategic plan is in place.

3.6.3 Organising farmers through co-operatives

Although it can be accepted that the transaction cost of procuring from a number of small firms, as opposed to larger, commercial units, would be higher, Key & Runsten (1999) are of the opinion that there could be a benefit for small farmers in creating marketing co-operatives with the aim of lowering transaction costs, while also addressing the constraints faced due to their small size.

Successful case studies of small-scale farmers that grouped themselves (or were grouped into co-operatives with the assistance of an external agent), in order to counter the constraints and diseconomies of scale, are prominent in less developed or developing countries where subsistence farming is usually the status quo. The results from four innovative case studies, one from China, one from Guatemala, one from Hungary and one from Kenya, are summarised in Table 3.2, detailing the initial state of affairs, main constraints, the strategies followed to form groups or clusters, and some of the results of their actions.

Table 3.2 Summary and findings of organising small farmers through co-operatives' case studies

CASE STUDY	INITITIAL STATE AND PROBLEMS EXPERIENCED	STRATEGIES IMPLEMENTED	RESULTS
Collective Action by small watermelon farmers in China *(An individual farmer's own initiative to train villagers to produce watermelons based on his production methods, and establishing a co-operative to reduce risks, to improve margins and to access formal markets with bigger volumes, while still maintaining the quality of small-scale production)* (Zuhui et al. 2007)	• Small-scaled production (average less than 0.1 ha per person) • Small farmers marginalised by middlemen, while farmers carried substantial risk in value chain • Farmers had low status in supply chains • Farmers inexperienced in terms of production and marketing, outdated ideas	• Established a brand and standards based on production, quality inspection, packaging and sales • Established two holdings (winter and summer production areas) to supply watermelons all year round • Established a co-operative with 30 initial growers with a linkage to a marketing network • Only members with at least three years' experience could join the co-operative to ensure quality and commitment • Inputs and growing plans provided for members	• Higher returns (almost 100% increase in profit margin – brand name and quality fetched higher prices) • Co-operative produced on large scale for big buyers, while still ensuring food safety and quality because of small individual areas to be managed and adherence to brand standards • Members benefited from subsidies from Government supporting the co-operative and co-operative assets (machinery and equipment) • Wholesalers attracted to the co-operative because of the brand, quality and volumes, which resulted in easier marketing for the group of farmers
Guatemalan small producers (*Aj Ticonel, a marketing and export company initiative, promoted the cultivation of "modern" crops for the export market, rather than traditional crops by small-scale farmers. Assistance in terms of knowledge and planning was provided to enable the farmers to increase their competitiveness and profitability)* (Monterroso et al. 2006)	• Small-scaled production (87 % of families farming on less than 1 ha) • Limited arable areas with installed irrigation • Arable areas remote (far from cities) • Limited access to technology and equipment • Producers inexperienced in the crops to be produced for the export market	• Collection centre established near producers from where produce is transported to main facility • Financing and credit loans provided to producers • Farmers divided into production groups with group representatives taking charge • Communication and orders through group representatives only to prevent misdirected communications • Technical assistance provided to groups • Training provided in quality standards and Good Agricultural Practices (so that producers could be familiar and equipped with the quality that is required) • Low quality products not accepted by collection depots, and farmers made aware of this • Weekly production planning meetings held, and areas which needed to be planned and prepared for future production identified	• Farmers in this initiative improved their profitability by more than 200 % • Farmers could increase their growing cycle from two to three crops a year because of possible financing of irrigation infrastructure, planned planting programme and "guaranteed off-take" • Although the offset point for exporting produce was out of reach for farmers, they could deliver produce to a central collection point • Cultivated areas could be expanded on a yearly basis as farmers developed because of "guaranteed off-take", provided the quality was sufficient

Table 3.2 Summary and findings of organising small farmers through co-operatives' case studies (continued)

CASE STUDY	INITIAL STATE AND PROBLEMS EXPERIENCED	STRATEGIES	RESULTS
Linking of small farmers to formal markets in Hungary *(Collective action by small-scale producers and rural SME's to establish a producers' organisation (Mórakert co-operative) to co-ordinate issues in the evolving supply chain of Hungarian fresh produce)* (Zoltán Bakucs et al. 2007)	• Two-fold agriculture sector similar to South Africa's, small farmers owning and farming on average of 1.2 ha each • Retail sector dominated by large foreign enterprises (in terms of consumer spending), which sourced products from big suppliers. • Lack of sufficient information about markets and prices • Very little negotiation power for producers	• Co-operative was established as a non profit organisation, thus running "business at cost" • Members of the co-operative initiated joint projects • The co-operative provided a cold storage depot, trucks and other assets, although individual farmers also had access to some assets • The co-operative collects produce from members and non-members, and adds value to products at depot (sorting, packaging etc.) • The co-operative sells collective produce directly to supermarket chains, wholesalers and processors • Established "production contracts" to promote competitiveness – each member has targets for quantities, qualities, delivery dates etc, with applicable bonuses and penalties	• Transaction costs reduced resulting in better profit margins for farmers • Collective action strengthened marketing negotiation power • Collective buying power of members resulted in savings of up to 20 % on inputs • New markets accessed for small farmers (supermarkets and export markets) • Because of larger quantities of production, larger volumes and better quality products could be marketed
Access to high value markets by Kenyan small farmers *(Kenyan farmers producing indigenous vegetables in addition to their exotic vegetable produced for public markets. An initiative was launched to organise and group small farmers, and to provide training and technical assistance in terms of the production, utilisation and marketing of the indigenous products)* (Ngugi et al. 2006)	• Although farmers were "semi-commercially" orientated, they farmed on small areas of land (less than 0.8 ha each) • Farmers traditionally subsistence of nature, trading only surplus products to informal markets • Farmers not organised • Inadequate inputs (volume and quality) • Lack of market information • Lack of access to markets, and exploited by middlemen • Lack of production and utilisation knowledge • Stringent conditions by key retail outlets in Kenya in terms of quality, appearance and pesticide residues	• Number of small farmers grouped together to form producer groups • Promotional campaigns to promote indigenous vegetables • Training was provided to groups of farmers covering production techniques, business management, administration, record keeping, invoicing, group dynamics, cohesiveness and more • A development agency analysed the value chain of the product and connected farmers with other stakeholders • Weekly meetings on training and technical advice to farmers • Negotiated weekly payments by buyers • Fines in place for members not turning up for meetings or activities to ensure commitment	• Farmers in the initiative had higher returns as a result of cutting out middlemen – between 30 % and 70 % more profit was achieved by farmers in the initiative than those marketing individually • Groups of farmers co-operating results in larger amount of produce, enabling continuous supply to supermarkets as required by them • Groupings enable stronger bargaining power with buyers

3.7 Summary and conclusions

The following key success factors were identified through the analysis of the case studies in this section, with specific reference to their strategies and successes achieved in similar situations than what is experienced by South African small farmers:

- An agent (internal or independent from the group) is required to manage the processes of establishing a group or cluster of farmers, to guide subsistence farmers into becoming “commercially-minded”, and to assist with production planning and leadership;
- Small farmers should be intentionally *linked* to a market, and not trying to gain a market share in the free and open market such as wholesale markets;
- Emphasis should be placed on the upgrading of the value chain. In this regard formal linkages to input suppliers' markets could be possible because of the increased economies of scale of small producers procuring their inputs, negotiating prices and marketing their produce together.
- Government support is required, although competitive advantage cannot be developed on this alone – a responsive private sector (businesses), as well as the will of the farmers, are also required;
- Collection centres, cold storage facilities and other infrastructure could be established through public funding or through assistance from the market that sources the products from the farmers (for instance a supermarket);
- Training and technical assistance by service providers should be provided to farmers in terms of extension services, advice and other information on a regular basis. Markets that procure the produce from the farmers, could also assist by visiting the farmers on a regular basis to provide inputs on production methods and information regarding what is required by the market;
- Small farmers should have access to market information in the form of prices, quality criteria and other requirements. These could be provided in the form of pamphlets (criteria and requirements) or electronic messages on their cell phones (prices);

- Financial assistance should be accessible to farmers, and up-front production loans or subsidies towards co-operatives should be negotiated with Government or the market that sources products from the farmers;
- A critical number of farmers are required to start collective action initiatives to justify the costs that are associated with it, as well as to provide the critical volume and scope of produce required by the market.
- Mechanisms should be in place to ensure the continued commitment of farmers towards the group. Potential members should be screened to determine their commitment and willpower to succeed, and incentives/bonuses/penalty fees should be implemented to ensure their commitment. Another possible way to screen members is to only allow members who have undergone specific training sessions and are committed to the programme;
- A brand, complete with quality criteria and standards, should be established by farmers to promote their produce and their values or aims to consumers. A collective brand under which a group of farmers market their produce could also assist in creating trust and co-operation amongst members, as opposed to every member working towards his own gain.

The clustering analysis tools and the key success factors that were identified from the case studies of collective action by small farmers in developing economies, coupled with the key success factors and cluster analysis frameworks of the previous two chapters, will be used as building blocks in the development of the Framework.

To determine the potential impact that a proposed strategy could have on the competitiveness of small farmers, one needs to be able to measure the potential improvement in competitiveness. The next element that is required as part of the Framework is a method to measure “current” competitiveness and the potential for “improved competitiveness”, which will be discussed in the next chapter.

CHAPTER FOUR

THE MEASUREMENT OF COMPETITIVENESS

4.1 Introduction

A challenge in finding a suitable method for the measurement of competitiveness of small farmers in South Africa is the fact that competitiveness is relative concept – two similar competing entities or processes should therefore be compared in order to determine the (relative) competitiveness of each against the other. For instance, the competitiveness of South African agriculture (as a whole) is often measured and compared to other countries (Esterhuizen et al.; Esterhuizen 2006; Esterhuizen et al. 2001), or the competitiveness of producing particular agricultural products is measured (see for instance National Agricultural Marketing Council and Commark Trust 2007; Promar International 2005).

In his evaluation of the competitiveness of the South African agri-business sector, Esterhuizen (2006, p90) defines competitiveness as "*the ability… to compete successfully in order to achieve sustainable growth…while earning at least the opportunity cost of return on resources employed*".

Other definitions of competitiveness include:

> *The ability of a firm or a nation to offer products and services that meet the quality standards of the local and world markets at prices that are competitive and provide adequate returns on the resources employed or consumed in producing them* (The Business Dictionary)
>
> *A comparative concept of the ability and performance of a firm, sub-sector or country to sell and supply goods and or services in a given market* (Wikipedia)

Usually refers to characteristics that permits a firm to compete effectively with other firms due to low cost or superior technology, perhaps internationally (Deardorff's glossary of international economics)

An indicator of the ability to supply goods and services at the location and in the form and at the time sought after by buyers, at prices that are as good as or better than those of potential suppliers, while earning at least the opportunity cost of returns on resources employed (Frohberg & Hartman [1997] in (Esterhuizen et al. 2001).

The central idea that stands out from the abovementioned definitions is the suggestion that a firm should be *able* to supply a particular product to a customer that desires the product, as cost effectively as possible. Since it can be assumed that a number of firms would try to supply the particular product that is demanded by the hypothetical customer, firms will compete with each other in terms of the four P's of marketing [Product, Price, Promotion and Place] to determine whose product the customer would eventually prefer (Coetzer 2004).

The concept of competitiveness, as taken from the different views discussed above, can therefore be seen as **the ability to supply**:

a) a *product* that is in demand,
b) at a market related *price* (or the price a customer is willing to pay for the product),
c) while spending less money to produce the product than what is offered for the product (thus making a *profit*),
d) at the *place* and *time* (*promotion*) at which customers demand the product,
e) and continuing to supply this product at the volumes required, as long as the product is in demand (thus *continuous supply*, being "in the market" continuously).

4.2 Models for the measurement of competitiveness

Buckley, Christopher and Prescott (1988, as quoted in Esterhuizen 2006) distinguished between three different formats or methods for measuring competitiveness:

- The measuring of **competitive performance** against other countries;
- The measuring of **competitive potential** based on the availability and influence of factors;
- The measuring of **competitive process**, or how competitive potential is converted into competitive performance.

Out of the three types mentioned above, the measurement of *competitive potential* and *competitive process* are specifically relevant for the purpose of this study, since a framework is sought to improve the competitiveness of a particular sector of farmers in terms of their ability to supply fresh produce to markets. This is based on the resources and potential at their disposal. It is anticipated that this ability to supply produce competitively would result from improving the utilisation of their competitive potential (based on resources available to them), as well as their efficiency in turning their competitive potential into competitive performance.

In his study of the competitiveness of South African agriculture, Esterhuizen (2006) reviewed and discussed a number of different models to measure competitiveness witin the agricultural sector. These models, together with Esterhuizen's conclusions on the suitability of each in a South African context, were reviewed to identify an appropriate tool to measure the competitiveness of resource poor farmers. The models that were investigated and reviewed are listed in Table 4.1, with a short description regarding their relevance and suitability for this study.

Table 4.1 Summary of agriculture competitiveness measurement models
(as discussed in Esterhuizen 2006)

Model	Comments	Suitability for this study
Competitive Indexes	Measures international competitiveness by comparing a country's relative competitiveness to one another	**Not suitable** in the context of this study – focuses on international competitiveness between countries
Real exchange rate	Considers a basket of tradable goods and the appreciation/deprecation of the of the real exchange rate from different countries	**Not suitable** in the context of this study – focuses on international competitiveness between countries
Foreign Direct Investment	Measures foreign ownership of assets as an indication of the competitiveness of production	**Not suitable** in the context of this study – could be used to measure competitiveness of the agricultural sector as a whole, but not a sub-sector
Growth share matrix	Considers *market share growth rates* as indication of competitiveness	**Not suitable** in the context of this study – more suitable for large firms and not for small companies of small farmers
Export performance	Measures the share of product in terms of the total world trade as indication of competitiveness	**Not suitable** in the context of this study – exports not within reach for small resource poor farmers
Unit labour costs	Measures competitiveness based on productivity – the cost of labour input to produce one unit of output	**Not suitable** – difficult to measure the data required in the "informal" sector, and can give misleading results (low labour costs not sustainable as a competitive strategy (Porter 1990, Esterhuizen 2006)
Balassa's Revealed Comparative Advantage method	Measures a country's share of the world market in one commodity relative to its share of all traded goods	**Not suitable** in the context of this study – Based on export and international trade of more than one produce
Production cost comparison	A comparison of production costs and gross margins between different enterprises as measurement of relative competitiveness	**Suitable** – measures competitiveness in terms of profitability, and provides ability to measure improvements in competitiveness
Domestic Resource Costs	The calculation of different policy options as measurement of comparative advantage	**Not suitable** in the context of this study – although policies are an important aspect for competitiveness and development of small farmers, this is not the focus of this study
Porter's Diamond model	Measures competitiveness and potential through an evaluation of six determinants of competitiveness	**Suitable** – although used elsewhere to develop the framework of competitiveness, thus not suitable for the measurement of competitiveness in this study
Business confidence index	Measurement of demographic, economic and social changes, and their effect on the quality of life and business environment in a specific country	**Not suitable** in the context – measures index for the country as a whole and compares on international level

In more than one of the models listed in Table 4.1 the export component or international share of a product is used for measuring competitiveness. In the context of this study, and with the fact that small farmers struggle to access and compete in local markets being one of the biggest considerations, the focus on global competitiveness is not applicable. The more suitable models in the context of this study are the *Production Cost Comparison* and *Porter's Diamond of Competitiveness*, with Porter's model already being part of the Framework. The *Production Cost Comparison* method will thus be used as measuring tool for competitiveness and improvements in competitiveness, and will be analysed in more detail in the following section.

4.3 The Production Cost Comparison method

In order to determine competitiveness through the Production Cost Comparison method, the gross margin of production should first be calculated by subtracting a farming operation's expenses from its incomes. To get the gross margin in a comparable format, the gross margin should be related to a unit – gross margin per hectare or gross margin per tonne of final product. By comparing gross margins achieved per unit of final product, the ability of all farmers to produce a final product at a profit can be compared on an equal basis, and farmers can be ranked in order of competitiveness (based on profitability).

Competitiveness in this study will be measured through the calculation and comparison of gross margins per unit (tonnes or kg) of final products. The comparison could be made between two individual farmers, or, since this study aims to provide a framework for improved competitiveness, the method of *gross margin per unit* comparison could also be used to analyse the potential effect a proposed strategy could have on the competitiveness of a particular farmer. The comparison could therefore also be made between two different scenarios for the same farmer.

4.3.1 The COMBUD production planning guide

In order to develop a calculation sheet for calculating the gross margin per unit of final product from a range of inputs, a list of common expenses and incomes was identified from

an existing agricultural planning tool. The Department of Agriculture (Western Cape) publishes the *COMBUD enterprise budget guide* every four years, which farmers use for agricultural production planning through production cost and gross margin estimations (see for instance Western Cape Department of Agriculture: Agricultural Economics 2007). Although the purpose of these guides is for short term planning, it provides a list of input costs, with typical values and margins (per ha and per tonne of final product) that could be expected. These guides are used by commercial farmers as benchmark reference documents during planning. These guides are not normally utilised in the emerging farming sector, and therefore some of the estimations of costs could be inaccurate for application in the small-scale and resource poor (for instance without the correct implements or irrigation infrastructure) farming sector. However, even thought the costs and figures stated in these guides does not apply to the emerging farmer sector, the list of typical expenses can still be seen as "generic" or typical agricultural production expenses. The guide could thus also be used for the analysis of production costs in the emerging farming sector, subject to more accurate estimations of the applicable emerging farming sector's costs and expected yields.

A typical COMBUD sheet (in this case for producing carrots in the Boland area) is shown in Table 4.2 for discussion purposes. The first page (page 10 on the sheet) can be seen as consisting of two different sections. The top five lines provide information regarding the crop, the method of irrigation, the target market and assumptions regarding the climatic area. This information is repeated in the bottom four lines of the page, stating the product and intended market ("Yellow carrots for the fresh market"), method of irrigation ("Sprinkle irrigation"), the irrigation and labour costs per ha and the author and date of the report. The middle section of the page, which continues onto page 11 of the COMBUD guide, is divided into an income and expense section. In this section, detail regarding income potential and specific costs that could be expected is provided. There are six columns, which provide the following information:

- First column: A description of the item
- Second column: The unit in which the item is measured (i.e. litre or kilogram)
- Third column: The price per unit (i.e. R130.00 per kilogram)
- Fourth column: The "Qty" (quantity) of units per ha (i.e. yield of 25 tonnes/ha or 4 kg of seeds per ha)

- Fifth column: The cost or income per ha (**Price per unit** x **Qty**)
- Sixth column: The value per yield unit, relating the specific cost or income to a Rand per final product delivered (cost or income per ha [**column 5**] x Qty yield per hectare)

Table 4.2 Example of COMBUD's production costs estimations for carrots in the Boland
(Source: Western Cape Department of Agriculture: Agricultural Economics 2007, p.10)

GROSS MARGIN

Enterprise budget Page 10

Budget No. MCBADMIN796 Date Modified 30/07/2008 02:08:25 PM

1/1/1/1/391 - CARROTS - Fresh market

Country South Africa **Land Type** 1_Agter-Paarl/Paarl

Province Western Cape **Farming Area** BOLAND

Status P **Farming Unit** HORTICULTURE [S.T] - Sprinkle fast fit

Use this Budget only as aid in the planning process.

	Unit	Price Per Unit	Qty	Per Ha	Value Per Yield Unit
GROSS INCOME			**25.00**	**115 832.50**	**4 633.30**
Product Income					
Product Income					
Carrot	Ton	4 633.30	25.00	115 832.50	4 633.30
MARKETING COSTS				**5 791.62**	**231.66**
Market Commission	P	5.00	115 832.40	5 791.62	231.66
GROSS INCOME minus MARKETING COSTS				**110 040.88**	**4 401.64**
ALLOCATABLE VARIABLE COSTS				**13 774.03**	**550.96**
Directly allocatable Variable Costs				**11 827.96**	**473.12**
PRE HARVEST COSTS				**8 352.96**	**334.12**
Consumable Items/Costs					
Add - Fertilizer					
Potassium Nitrate	Ton	4 910.00	0.30	1 473.00	58.92
Fertiliser - Spread					
2.3.4 (30)	Ton	2 562.50	0.50	1 281.25	51.25
Fertilizing - Add					
LAN 28%	Ton	2 612.00	0.30	783.60	31.34
Fungus control - Spray					
Apron XL 350 FS	Litre	3 210.00	0.90	2 889.00	115.56
Pest control - Spray					
Decis	Litre	130.00	1.50	195.00	7.80
Planting material - Add					
Carrot Seed	Kilogram	230.50	4.00	922.00	36.88
Water - Rights					
Scheme costs	Hectare	581.11	1.00	581.11	23.24
Weed control - Spray					
Afalon 450SC / Linagan	Litre	228.00	1.00	228.00	9.12
HARVEST COSTS				**3 475.00**	**139.00**
Casual Labour					
Vegetables - Market					

Yellow carrots for the fresh market.
Sprinkle irrigation.
Irrigation costs / Ha = R 42.13 Irrigation Labour costs / Ha = R 300.00

Report Generated By : MCBADMIN Page 1 of 2 Date Printed 08/08/2008

Table 4.2 Example of COMBUD's production costs estimations for carrots in the Boland (continued)
(Source: Western Cape Department of Agriculture: Agricultural Economics 2007, p.10)

GROSS MARGIN

Enterprise budget Page 11

Budget No. MCBADMIN796 Date Modified 30/07/2008 02:08:25 PM

1/1/1/1/391 - CARROTS - Fresh market

Country South Africa **Land Type** 1_Agter-Paarl/Paarl

Province Western Cape **Farming Area** BOLAND

Status P **Farming Unit** HORTICULTURE [S.T] - Sprinkle fast fit

Use this Budget only as aid in the planning process.

	Unit	Price Per Unit	Qty	Per Ha	Value Per Yield Unit
Casual Labour (Lower)	Hour	6.25	80.00	500.00	20.00
Consumable Items/Costs					
Packaging material - Buy					
Vegetable bag (10-25 kg bag)	Each	1.19	2 500.00	2 975.00	119.00
GROSS MARGIN ABOVE DIRECTLY ALLOCATABLE VARIABLE COSTS				**98 212.92**	**3 928.52**
In Directly Allocatable Variable Costs				**1 946.07**	**77.84**
PRE HARVEST COSTS				**1 817.01**	**72.68**
Depreciation				383.84	15.35
Fuel Costs				605.10	24.20
Insurance and Licence Costs				64.34	2.57
Interest Costs				320.60	12.82
Maintenance and Repair Costs				443.09	17.72
HARVEST COSTS				**129.06**	**5.16**
Depreciation				19.55	0.78
Fuel Costs				60.30	2.41
Insurance and Licence Costs				5.21	0.21
Interest Costs				17.93	0.72
Maintenance and Repair Costs				26.07	1.04
TOTAL PRE HARVEST COSTS				**10 169.97**	**406.80**
TOTAL HARVEST COSTS				**129.06**	**5.16**
GROSS MARGIN ABOVE TOTAL ALLOCATABLE VARIABLE COSTS				**96 266.85**	**3 850.67**
Interest on Working Capital				**202.11**	**8.08**
Regular Labour Costs				**0.00**	**0.00**
Irrigation Labour				**0.00**	**0.00**
MARGIN ABOVE SPECIFIED COSTS				**96 064.74**	**3 842.59**

Yellow carrots for the fresh market.
Sprinkle irrigation.
Irrigation costs / Ha = R 42.13 Irrigation Labour costs / Ha = R 300.00

Report Generated By : MCBADMIN Page 2 of 2 Date Printed 08/08/2008

In the example shown in Table 4.2, for instance, the amount of required planting material is estimated at 4 kg/ha, at an average cost of R230,50 per kg. The total costs per ha for planting material is thus estimated at

R4,00 x R230,50 = R 922,00 per ha, which is the amount in column five.

Relating this to the contribution that a particular item has on the cost of the final product:

R922,00 ÷ 25 tonnes/ha yield = R 36,88 of planting material required per tonne of final product, which is the amount in column six.

The only income that is assumed comes from selling the carrots through the Cape Town Market, at an estimated price of R 4 633.30 per tonne. The variable expenses associated with producing and marketing the product is divided into the following:

- Marketing costs, which in this case is the *ad valorum* commission applicable on the National Fresh Produce Markets. The costs are calculated as a percentage of the selling price, which is regulated by the market;
- Pre-harvest costs, which include all inputs for land preparation, planting and inputs during cultivation;
- Harvest costs, which refer to the costs required to harvest and package products for the market (value adding);
- Indirect allotted[17] variable costs, which include costs incurred as part of production actions but not measurable in “unit quantities”, such as depreciation, running costs and insurance;
- Labour costs and interest on working capital.

The benchmark gross margin (based on the variable costs listed in this example) that can be used for planning purposes is calculated as follows:

[17] Referred to as "allocatable" in Table 4.2

	GROSS INCOME
Minus	MARKETING COSTS
Minus	ALLOCATABLE VARIABLE COSTS
	GROSS MARGIN ABOVE TOTAL ALLOCATABLE COSTS
Minus	INTEREST ON WORKING CAPITAL
Minus	LABOUR COSTS
	MARGIN ABOVE SPECIFIED COSTS

The following additional observations regarding the COMBUD guides should be noted:

- For each different crop, COMBUD calculates the benchmark incomes, expenses and margins for a specific region based on a specific method of irrigation, which will differ from farm to farm. However, the COMBUD sheets are only part of a "guide" – a tool for planning purposes, to provide insight into the major costs and incomes that can be expected for a specific crop, but should not be assumed to contain precise figures (the figures and amounts required are guidelines);
- Five different methods of irrigation are used in the guides – drip, micro, sprinkler, centre pivot and dryland (irrigation by rain). Flood irrigation is the simplest and most primitive form of irrigation, and also the least expensive in terms of capital, yet it is also seen as the most inefficient means of irrigation, which is probably the reason for it not being considered in the COMBUD sheets.

  Different methods of irrigation should be installed in different circumstances, which depend on inter alia the crop selection, soil type and area to be irrigated. A discussion on the selection of irrigation, and the effect it has on the yields of different crops in different environments, is beyond the scope of this study, and will not be elaborated upon any further.
- In the COMBUD example shown in Table 4.2, 5% is subtracted as a marketing cost for the *market commission*. However, an additional 7,5% should be subtracted from the gross income, which is known as the *agent's commission* – the total marketing cost would thus be 12,5% of the selling price of a product marketed through any National Fresh Produce Market. A commission of 12,5% will be used in the rest of the study.

- The COMBUD sheets only take variable input costs, and some common costs associated with agriculture (such as land rental/financing costs, water entitlement costs and fixed labour costs) into account for the calculation of the gross margin, and as a result the margin that is calculated is termed the "margin above specified costs". For this reason, the margin calculated in the example in Table 4.2 is ± R96 000/ha, a margin of about 82% on turnover. Benchmark gross margin figures for agri-businesses in the farming sector are between 5% and 10 %, and anything above a 10% gross margin on turnover can be seen as an excellent return, especially for a cash crop such as carrots. For the purpose of this study, the additional costs associated with production should be included to provide a realistic picture of the gross margin achievable.

The COMBUD sheets provide a foundation from which agricultural planning and production cost analysis could be done, and also provides a good idea regarding the types of input costs and expenses that could be expected for the production of specific crops. As part of the Framework, a modified sheet for the calculation of the production costs and gross margins will be used for the measurement of competitiveness. The purpose of such a calculation sheet would be three-fold:

- To determine the competitiveness of an individual small-scale farmer, based on a production cost and gross margin calculation;
- To identify "sensitive" expenses and incomes (or key success factors) that could be addressed in order to improve the gross margin (and thus the competitiveness);
- To determine the probability of improved competitiveness, should a *collective action* and/or *value chain-linked* strategy be implemented.

It is anticipated that the above could be measured through a *simulation model* by calculating the gross margin outcomes from a number of variable standard inputs provided, according to the gross margin calculations indicated in the COMBUD guide.

4.3.2 The variability of input costs

Analysing the typical input costs of farmers, as listed in the COMBUD sheets, a number of items are identified that are dependent on the volume purchased (higher volume orders could result in lower costs per item), and the relationship between the supplier and the buyer. A large buyer, with a sound relationship with a supplier, would therefore be able to "create" a competitive advantage over smaller and newer competitors. It could therefore be in the buyer's best interest, for example, to increase the volume of stock purchased at a time, and to stick to one supplier in order to build a good relationship. However, the volume of inputs purchased is directly linked to the size of a farming operation, and as a result the strategy of collective action between farmers comes into consideration for improving competitiveness by means of improved economies of scale.

The following expense items are volume dependent:

- Planting material
- Packaging material
- Fertiliser, pest control, fungus control and compost
- Fuel costs (e.g. bulk discount on diesel)

Other indirect improvements in gross margins that could be created by belonging to a co-operative – or a similar vehicle that small farmers can use as a collective marketing mechanism – include the following:

- Improved transport costs (transport could be provided at cost by the co-operative rather than an outside contractor);
- Reduced harvest and packaging labour costs (farmers' produce could be packed collectively in the co-operative facility under the same brand name, rather than outsourcing it or not doing it at all);
- Farmers could have access to bigger, more modern and more efficient equipment, which could be shared between members on a scheduling basis (it would for

instance not be viable for an individual farmer to own such equipment for the small scale on which he operates);

- Farmers would be able to focus on farming, while the value adding and marketing of produce would be taken care of by specialists who form part of the co-operative;
- Specialist input providers would be willing to provide assistance to farmers, since the group of farmers would create a critical volume of work to justify the service provider's time and efforts. The attention and inputs provided by the service provider could improve the yields and management practices of the farmer, resulting in better quality produce and higher returns;
- A saving could be made by trading directly with supermarkets and other upper-end buyers through the co-operative, versus trading through an agent on the Market, where a commission would be subtracted from the selling price.

At this point, it should be mentioned that gaining a market share in supermarkets is not as easy as trading produce through the traditional National Fresh Produce Marketing system. Stricter quality and phyto-sanitary criteria are applicable, large volumes and a continuous supply is required, and supermarkets also demand strict delivery times. However, the fresh produce prices are generally higher than those achievable on Markets. The risk of supplying a supermarket, versus that of supplying the Market, is also lower – trading with supermarkets is done on a wholesale basis (therefore the supermarkets take ownership of the produce the moment it is delivered to them), while the traditional marketing system makes use of agents to sell produce on the farmer's behalf. As a result any unsold produce would represent a loss to the farmer, and it is for this reason that marketing produce in this fashion carries a certain amount of risk.

Trading through a supermarket also provides farmers with better planning control – volumes, criteria, delivery times and contracts are normally agreed upon at the start of a season, and in some cases supermarkets could even provide small and resource poor (though capable) farmers with operational (bridging) funding (as in the Spar case study that was discussed in the previous chapter).

The optimisation of expenses through a collective action strategy, as highlighted above, would, however, also create some additional costs. The following additional expenses are anticipated for farmers that are producing and trading collectively, as opposed to individually:

- Membership fees towards the co-operative management body to cover operational costs and overheads of the co-operative, including running costs (such as rent, water and electricity, etc.), salaries, project co-ordination, marketing co-ordination, equipment maintenance, etc;
- Registration and certification costs required by formal markets (i.e. HACCP certification of facilities, GLOBALGAP and/or Organic certification for production);
- Cold storage, handling and transport costs for the provision of such services by the co-operative (financing costs and operational costs) in order to improve the quality and shelf life of the produce supplied to formal markets.

The abovementioned additional costs are attributable to actions that can, in some cases, be seen as the minimum criteria for supplying formal markets on a sustainable basis.

One of the goals of the production cost calculation sheet (to be developed as part of the Framework) is to estimate the effect that some of the abovementioned opportunities, coupled with the additional cost implications, could have on a farmer's gross margin. Once a strategy has been drawn up based on the optimisation of input costs through collective action, or the linkage of clustered farmers with formal markets (or both), it would be necessary to determine whether the strategy would have the desired effects on the bottom line, and what the probability of a successful outcome would be.

Earlier it was shown that the gross margin of a farming enterprise is calculated through the summation of a number of variables, and that benchmarked, calculated figures exist in the form of the COMBUD guides. To develop a calculation sheet for the measurement purposes of this study, it is proposed that the COMBUD guides should be taken a step further. It is proposed that the outcomes of the calculation should be simulated based on variable inputs, so that the effect of this variability could be bought into consideration when calculating the gross margin. By simulating the probabilities of the likely outcomes in this manner, one can

analyse the expected outcomes based on the inputs supplied to the model, even if the inputs supplied can vary as a result of the volumes purchased and other economic considerations. In addition, such a model should also be capable of measuring the potential improvement in competitiveness that a strategy (based on reduced production costs through collective action) could have.

The development of such a sheet is discussed in the next section.

4.4 The Production Cost Analysis Sheet

The variability of (and opportunities to improve upon) input costs, as highlighted in the previous section, have been included in the development of a Production Cost Analysis Sheet [PCAS] designed to measure competitiveness, as well as the potential effect on the gross margin, by addressing certain key success factors. The PCAS Excel sheet makes use of the Monte Carlo simulation method to simulate the probability of producing a profitable crop (in other words a positive gross margin), based on a series of variable inputs[18]. Monte Carlo simulations are often used for studying systems with uncertain or variable inputs (Palisade Corporation 2008), which is why it was chosen as algorithm for this model.

All inputs can be modelled as statistical distributions in the spreadsheet to provide an "uncertainty weighting" to the input, based on the anticipated variability of the input. Since most of the input costs are variables, they can be modelled as distributions to determine the effect of their fluctuations in price, or the possible savings that could be negotiated or achieved.

As with an simulation, the outcome will be only as good and accurate as the inputs that are provided. Accurate inputs in the form of appropriate distribution functions are only possible by spending a lot of time on the development of these functions from first principles, based on a thorough knowledge and understanding of the different sectors that influence the prices of input costs. For this study, the PCAS sheet will only consider the random variability of

[18] A trial version of the commercial plug-in for Excel, @Risk, was utilised to model the distribution functions in the Excel sheet and to run the Monte Carlo simulation. The trial version has full functionality, but is only valid for 15 days before the free version should be registered or downloaded again. The full version of this programme can be purchased at about US$2000.

inputs around an average value related to the current average price, and therefore normal (Gaussian) distributions are mostly used to model inputs.

A typical blank PCAS sheet which was developed in Excel, with the COMBUD sheets as reference, is shown in Table 4.3. The PCAS sheet template and its workings are explained by means of an example in the next section, modelling the gross margin for carrots from a small farmer.

4.4.1 The estimation of distribution functions from historical data

The first input that should be modelled is the selling price that could be expected for the product, which, in the case of this illustrative example, is carrots. The product income distribution of carrots can be modelled using the average selling prices and fluctuations for the product at Cape Town Market for the period March 2005 to December 2008. The graph in Figure 4.1 is a representation of the average selling price of unsorted, bundled carrots at this Market, which is the form in which small farmers would most likely market their produce. From the graph, it can be estimated[19] that the mean or average value of carrots over the past 45 months, was approximately R1,80 per kg (or R1800/tonne).

[19] Unfortunately the raw data was not obtainable, and thus the data that was required to model the distribution function had to be estimated from the graphs of historical data. However, the estimations made from the data on the graphs should be accurate enough for the purpose of this study.

Table 4.3 A blank PCAS Excel sheet

ASSUMPTIONS			Expected Packout:		
			Class I		
			Class II		
			Class III		
			Product:		
			Expected Yield [tonne/ha]:		

Individual small farmer scenario					
	Unit	Price per unit	Quantity per ha	Cost per ha per season	Value per yield unit
a) GROSS INCOME					
Product Income (Class I)					
Product Income (Class II)					
Product Income (Class III)					
b) MARKETING COSTS					
Market and agent commision					
c) GROSS INCOME minus MARKETING COSTS (a-b)					
d) ALLOCATABLE VARIABLE COSTS (e+f)					
e) Pre-harvest cost					
Fertiliser (various)					
Allow for					
Fungis control (various)					
Allow for					
Pest control (various)					
Allow for					
Weed control					
Allow for					
Planting material					
Water rights, allow for					
Other					
Other					
Other					
Other					
f) Harvest costs					
Casual labour					
Packaging material (per tonne of final product)					
Transport contractor (allow for 4 tonne delivery vehicle)					
Other					
Other					
g) GROSS MARGIN ABOVE DIRECTLY ALLOCATABLE VARIABLE COSTS (c-d)					
h) INDIRECTLY VARIABLE COSTS (i+j)					
i) Pre-harvest cost					
Depreciation					
Fuel costs					
Insurance and license costs					
Interest costs					
Maintenance and repair costs					
j) Harvest costs					
Depreciation					
Fuel costs					
Insurance and license costs					
Interest costs					
Maintenance and repair costs					
k) TOTAL PRE-HARVEST COSTS (e+i)					
l) TOTAL HARVEST COSTS (f+j)					
m) GROSS MARGIN ABOVE TOTAL ALLOCATABLE VARIABLE COSTS (c-k-l)					
n) Interest on working capital (overdraft)					
o) Financing/rental costs					
p) Regular labour costs (salaries)					
q) Irrigation labour costs					
r) MARGIN/(LOSS) ABOVE SPECIFIED COSTS (for season)					

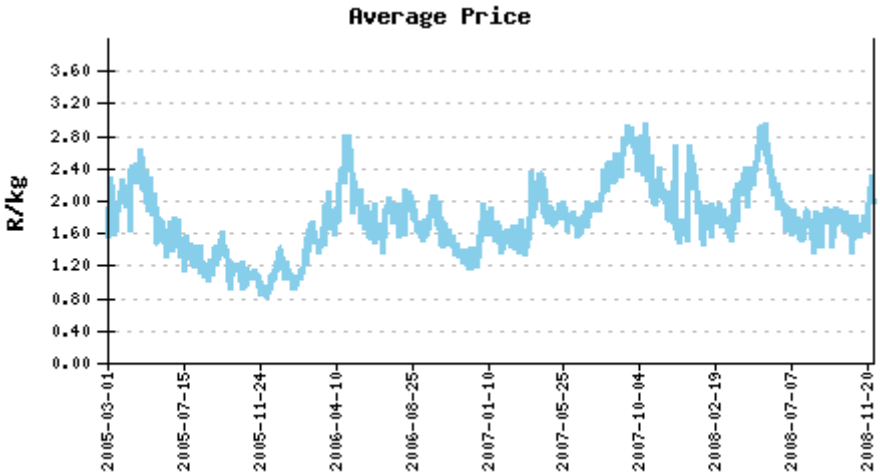


Figure 4.1 Average prices for bundled carrots sold at Cape Town National Fresh Produce Market – March 2005 until December 2008
(Source: www.technofresh.co.za)

Prices of all fresh produce normally fluctuate around an average value continuously, which is a result of the supply and demand of produce (in times of lower supply, the price goes up, and vice versa). This phenomenon is evident by comparing Figure 4.2 with Figure 4.1 – during the times when the quantity on hand was high, the average price dropped (see for instance the correlation between high supply and low prices during November 2005, and the lower supply and higher prices of October 2007).

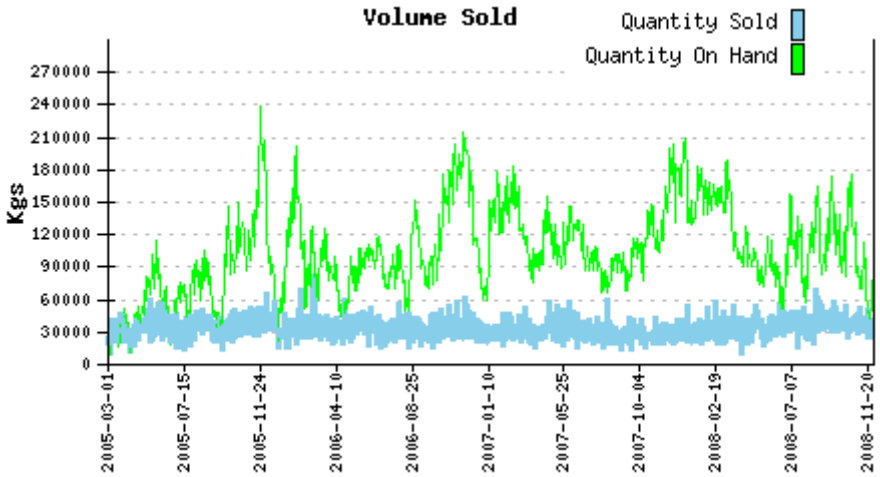


Figure 4.2 Volumes of bundled carrots on hand and volumes sold at Cape Town Market – March 2005 until December 2008
(Source: www.technofresh.co.za)

The fluctuation around an average value within a certain window, or band of values, indicates that a normal distribution could be utilised to model the probability of this input. The normal distribution is represented as the following function:

$$F \sim f(\mu,\sigma^2)$$

where (μ) is the mean value, and σ^2 the variance of the distribution.

Over and above the *mean* (μ) value that was estimated from the data in Figure 4.1, the other data that is required as an input to the normal distribution is the *variance* (σ^2), or standard deviation (σ). Despite the lack of physical data, the standard deviation could be estimated by utilising the *empirical rule* characteristic of a normal distribution, stating that:

a) about 68% of all values in the distribution will fall within 1σ either side of the mean value;
b) about 95% of all values in the distribution will fall within 2σ either side of the mean value;
c) and about 99,7% of all values in the distribution will fall within 3σ either side of the mean value.

The standard deviation of the price of carrots sold at Cape Town Market can therefore be estimated from the graph in Figure 4.1. From investigating the graph, it is determined that the majority of the prices over the past 45 months were between R0,80/kg and R3,00/kg (R800/tonne to R3 000/tonne). It can also be seen from the graph that about 95% of all the values of this distribution fall within a band with a radius of R1 000/tonne around the mean of R1 800/tonne (thus a window between R800/tonne and R2 800/tonne, as illustrated in Figure 4.3). R1 000/tonne can therefore be accepted as 2σ, with the standard deviation (σ) thus R500/tonne.

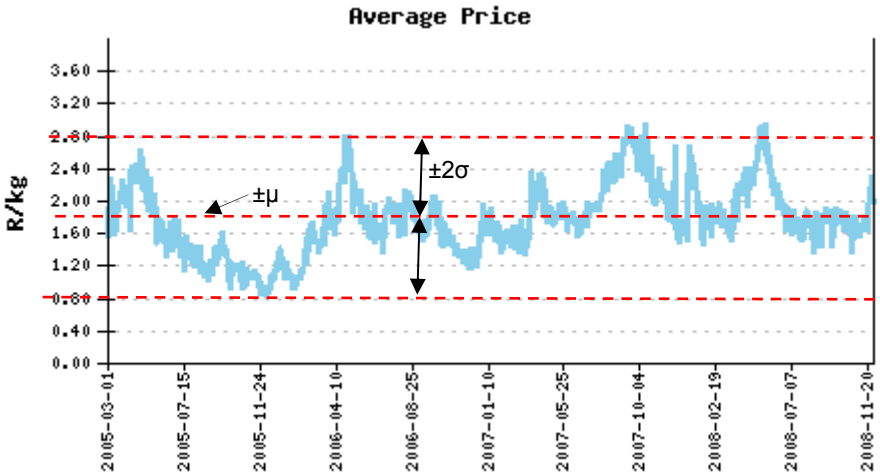


Figure 4.3 The estimation of the mean and the standard deviation of the price distribution of bundled carrots sold at Cape Town Market

The distribution function of the income potential of carrots, as drawn up with the *Excel @Risk* add-on simulation package, using the estimated mean and standard deviation, is illustrated in Figure 4.4.

Evaluating the results of the simulation with the inputs that were provided, it is found that the model that was used is relatively accurate – the following can be noted from the graph in Figure 4.4:

- The theoretical distribution model (the thin blue line) was fitted on the actual values of the simulation (the red bars), and the correlation between the theoretical values and the actual simulation values is indicated in the right hand column;
- The simulated mean value (indicated in the right hand column) is R1 799.7001 (the theoretical mean that was provided to the model is R1 800);
- The delimiters (two vertical lines running across the graph) were used to determine the percentage of values that fall within the "2σ radius window" of R800 to R2 800 that was chosen. The percentage shown at the top of the graph (95.4%) indicates the probability that a value contained in the function would fall within the standard deviation of R500 (the probability that was used to determine the standard deviation was 95%).

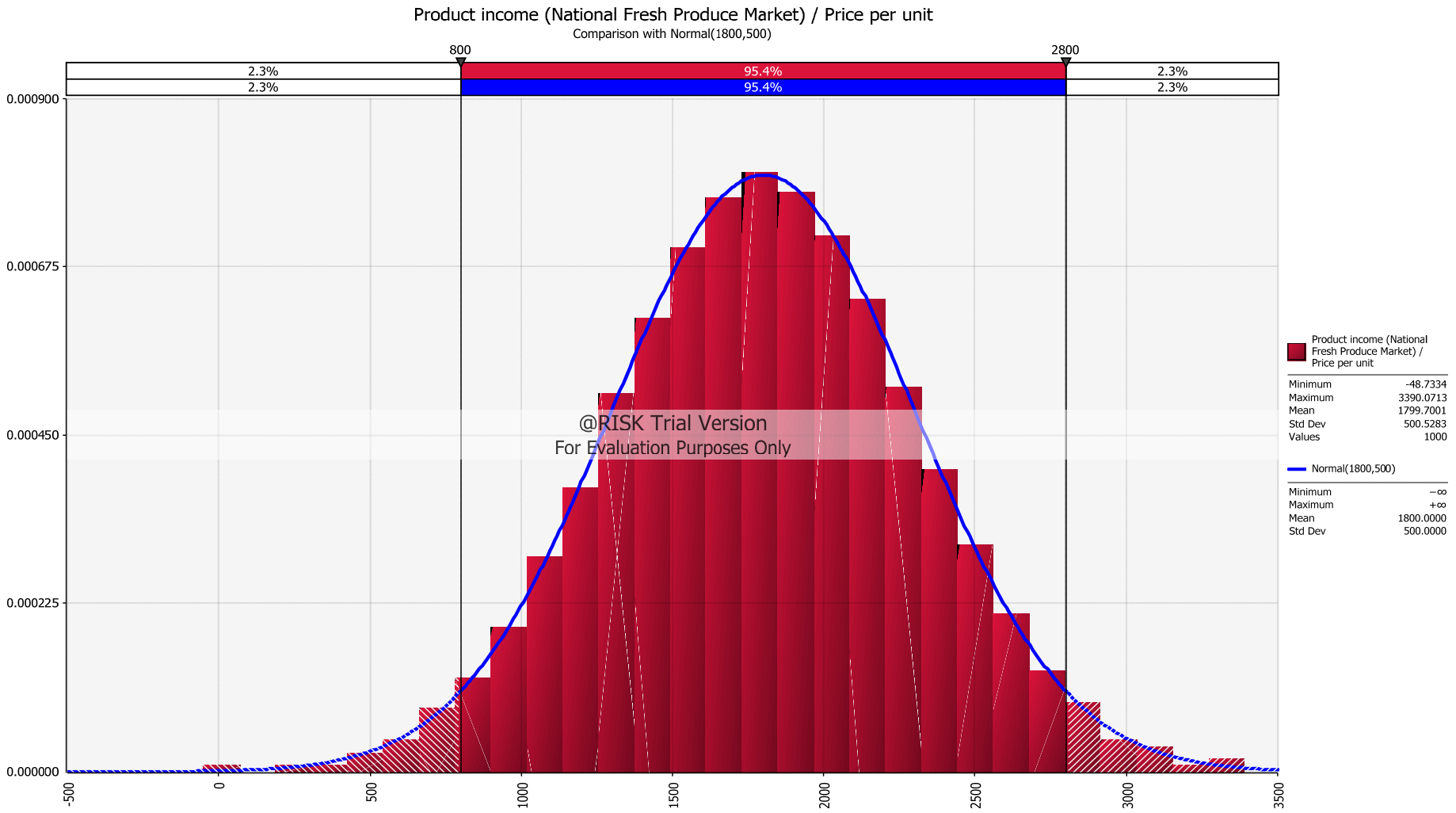


Figure 4.4 Distribution representation of potential income from unsorted carrots sold at the Cape Town Market

Although this model was not developed in a statistically correct manner from first principles and physical values, the method that was used provided a fast and efficient way to represent the data in a distribution format that is reasonably accurate. The rest of the variable inputs can be modelled in the PCAS model in a similar way to that which was used for modelling the income potential of carrots above. An abbreviated discussion regarding the modelling of the various inputs follows.

4.4.2 Assumptions for input cost and yield distributions

The following assumptions can be made for modelling common variable input costs associated with the cultivation and post-harvest actions of farmers:

- Product quality distributions can be modelled as normal or gamma distributions based on the anticipated pack-out percentages for Class I, II and III. For the purpose of this example, the pack-out distribution between the three different quality spectra was modelled with the assistance of a function in the *Excel @Risk* package. This function derives the distribution function of a graph of values by fitting a curve onto the values provided to Excel.

  For this example, the distribution function of quality versus yield was "chosen" as a gamma distribution with a mean of 2, and a standard deviation of 1.41. The graph was chosen so that all values fall between 0 and 10, with the values from 0 to 10 representing the scale of quality – 0 being the lowest quality and 10 the highest. The graph shown in Figure 4.5 represents the (hypothetical) likely outcome of the harvest of carrots for this example, with all values between 0 and 1 classified as Class III, values between 1 and 3 (the area around the mean) as Class II, and all values above 3 as Class I

  .

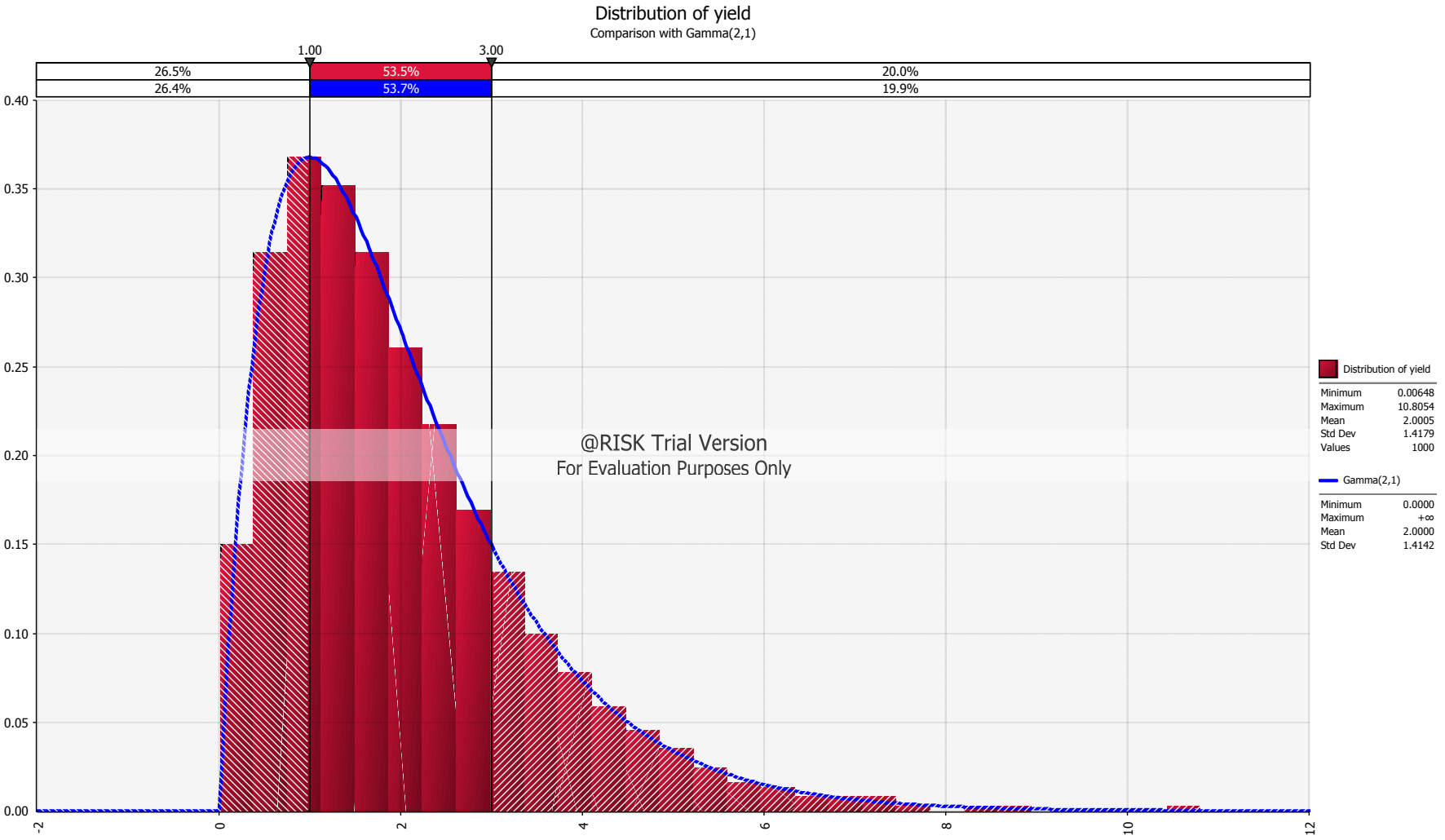


Figure 4.5 Results from quality vs yield simulation based on a hypothetically chosen quality distribution curve

By shifting the delimiters on the graph – which indicate the probability of values in each segment – the following can be read from the results at the top of the graph (the red bar represents the outcome of the simulation, and the blue line the theoretical values based on the inputs that were provided):

Class I products:	20% of total harvest
Class II products:	53.5% of the total harvest
Class III products:	26.5% of the total harvest

These simulated figures are realistic for an average farmer, and therefore the chosen distribution function will be used in this example[20];

The anticipated total product yield can be modelled based on benchmark figures. In this regard the conservative, likely and targeted yields of a number of common crops are given in Table 4.4 as an example. For this example, the potential yield of carrots is represented as a normal distribution, with a mean of 30 tonnes/ha and a standard deviation of 3.3 tonnes/ha (3σ estimated as 10 tonnes/ha), therefore implying that 99.7% of the values of the expected yield will fall between 20 and 40 tonnes/ha;

- All physical input costs (fertiliser, planting material, etc) are assumed as being flexible in terms of pricing (in other words prices could suddenly increase due to economic pressure or the rise in cost of raw products, or the price could be negotiated with regards to volume, or in terms of possible relationships with the supplier). For the purpose of this study, it is estimated that input prices can vary by approximately 30% either side of the average price.

  The physical input costs could therefore be modelled as normal distributions, with the average retail price per unit (in other words the price an individual farmer would pay) as the mean, and a standard deviation of approximately 10% of the mean value to allow for the 30% (3σ) price "volatility";

- Labour, marketing commission, water rights, interest on working capital and indirect variable costs are assumed to be fixed allowances since these are regarded as relatively standard costs (not much can be done to reduce these costs).

[20] The gamma(2,1) distribution that is used in this example is for illustrative purposes to describe the workings of the PCAS. The PCAS allows for the input of accurate data through means of any distribution function, and more accurate distribution functions could be modelled if sufficient data regarding the variable is available.

Table 4.4 Expected yields of a range of common vegetables

(Adapted from Department of Agriculture and Environmental Affairs, KZN, http://agriculture.kzntl.gov.za)

Crop	Yield in tonnes per hectare		
	Conservative	Likely	Target
Butternut	12	16	28
Cabbage	30	50	85
Carrot	20	30	40
Lettuce	13	22	35
Spinach	7	11	17
Tomato (open field)	30	50	70

Through subtracting a farming operation's estimated expenses from the estimated income based on average prices, one can estimate the expected gross margin. This is the method which is used in the COMBUD guides. In order to analyse the sensitivity or the impact of the different variables on the gross margin, and to calculate the probability that the gross margin would be positive or higher than say 5% of the total turnover, the outcome or gross margin should be modelled as a distribution function. This can be done through a Monte Carlo Simulation of the gross margin outcome based on the distribution functions of the variable inputs.

4.4.3 Modelling the expected outcomes through a Monte Carlo Simulation

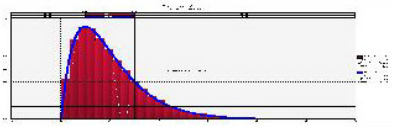
In order to calculate the distribution function and probability density function of the gross margin from the inputs provided, different expected samples of the outcome can be generated trough a Monte Carlo Simulation. The simulation makes use of a number of iterations for calculating the outcome, and for each iteration, new random variables are used for the inputs, chosen according to their distribution functions. At the end of the simulation, a

distribution function is fitted onto the outcome samples, which can then be further used to analyse the outcomes statistically. The results generated for the carrot example – through the modelling of the PCAS sheet – are included below. They consist of:

- **Table 4.5,** a screenshot of the Excel model input page, where assumptions regarding the distribution functions of variables are entered. The screenshot includes comments regarding the calculations and formulas of some of the variable cells. The formulas *Risknormal(x,y,Riskstatic(z))*, *RiskXtoQ(a,b)*, *RiskXtoP(c,d)* and *Riskoutput(("s") + t)* are *Excel @Risk* add-on functions, where
    - *Risknormal* is the function that models a normal distribution, with a mean *x* and a standard deviation of *y*;
    - *Riskstatic(z)* is the function to denote the value that is returned to the cell during standard Excel recalculations;
    - *RiskXtoQ(a,b)* is the function to determine descending cumulative probability for the target value *b* for the function *a* (in other words, to determine the probability of an outcome for function a to the value of b or higher);
    - *RiskXtoP(c,d)* is the function to determine ascending cumulative probability for the target value *d* for the function *c* (in other words, to determine the probability of an outcome for function c to the value of d or lower);
    - *Riskoutput(("s") + ƒ(t))* is the output function of the simulation, where *s* refers to the name of the output function, and *ƒ(t)* is the function that should be modelled as the output
- **Figure 4.6**, the result of the Monte Carlo Simulation (the distribution function of the gross margin, consisting of the samples of outcomes);
- **Figure 4.7**, a representation of the *probability density function* (pdf) of the outcome, which can be used to analyse the probabilities of specific outcomes (which is calculated by integrating the probability density function with the two outcomes for which the probability is sought. To calculate the probability of the gross outcome of the function *ƒ* to be between 0 and 10, for instance, one would calculate $_0\int^{10} pdf[f]$);
- **Figure 4.8**, a *regression chart* (or *tornado map*) of the simulation, illustrating the most sensitive variables in terms of their effect on the outcome.

Table 4.5 Values in the PCAS for simulating the gross margin of an individual farmer producing carrots, including comments

ASSUMPTIONS



=RiskXtoQ(RiskGamma(2,1),3)

=1-K4-K2

=RiskXtoP(RiskGamma(2,1),1)

Expected Packout:	
Class I (% of total yield)	20%
Class II (% of total yield)	54%
Class III (% of total yield)	26%
Product:	Carrots
Expected Yield [tonne/ha]:	30

=RiskNormal(30,3.3,RiskStatic(30))

Individual small farmer scenario

=RiskNormal(1800,500,RiskStatic(1800))

		Price per unit	Unit	Quantity per ha	Return/(Cost) per ha per season	Value per yield unit
a)	**GROSS INCOME**				**R 39 744.00**	**R 1 324.80**
	Class I and II income (National Fresh Produce Market)	R 1 800.00	tonne	22.08	R 39 744.00	R 1 324.80
	Class III income (iminimal thus excluded)			=K6*(K2+K3)		
b)	**MARKETING COSTS**				**-R 4 968.00**	**-R 165.60**
	Market and agent commision (fixed)	12.5%		R 39 744.00	-R 4 968.00	-R 165.60
c)	**GROSS INCOME minus MARKETING COSTS (a-b)**				**R 34 776.00**	**R 1 159.20**
	=RiskNormal(4000,400,RiskStatic(4000))					
d)	**ALLOCATABLE VARIABLE COSTS (e+f)**	=RiskNormal(3000,300,RiskStatic(3000))			**-R 33 898.00**	**-R 1 129.93**
e)	**Pre-harvest cost**				**-R 9 050.00**	**-R 301.67**
	Fertiliser	R 4 000.00	/tonne	1	-R 4 000.00	-R 133.33
	Fungis control	R 3 000.00	/litre	1	-R 3 000.00	-R 100.00
	Pest control	R 150.00	/litre	2	-R 300.00	-R 10.00
	Weed control	R 250.00	/litre	1	-R 250.00	-R 8.33
	Planting material	R 250.00	/kg	4	-R 1 000.00	-R 33.33
	Water rights	R 500.00	/ha	1	-R 500.00	-R 16.67
	Other	=RiskNormal(1000,0.1,RiskStatic(1000))				
	Other					
	Other					
	Other					
f)	**Harvest costs**				**-R 24 848.00**	**-R 828.27**
	Casual labour	R 7.00	/hour	80	-R 560.00	-R 18.67
	Packaging material (per tonne of final product)	R 1 000.00	/tonne	22.08	-R 22 080.00	-R 736.00
	Transport contractor	R 10.00	/km	220.8	-R 2 208.00	-R 73.60
	Other					
	Other					
g)	**GROSS MARGIN/(LOSS) ABOVE DIRECTLY ALLOCATABLE VARIABLE COSTS (c-d)**				**R 878.00**	**R 29.27**
h)	**INDIRECTLY VARIABLE COSTS (i+j)**				**-R 1 970.00**	**-R 65.67**
i)	**Pre-harvest cost**				**-R 1 870.00**	**-R 62.33**
	Depreciation				-R 400.00	-R 13.33
	Fuel costs				-R 600.00	-R 20.00
	Insurance and license costs				-R 70.00	-R 2.33
	Interest costs				-R 350.00	-R 11.67
	Maintenance and repair costs				-R 450.00	-R 15.00
j)	**Harvest costs**				**-R 100.00**	**-R 3.33**
	Depreciation				**R 20.00**	R 0.67
	Fuel costs				-R 60.00	-R 2.00
	Insurance and license costs				-R 10.00	-R 0.33
	Interest costs				-R 20.00	-R 0.67
	Maintenance and repair costs				-R 30.00	-R 1.00
k)	**TOTAL PRE-HARVEST COSTS (e+i)**				**-R 10 920.00**	**-R 364.00**
l)	**TOTAL HARVEST COSTS (f+j)**				**-R 24 948.00**	**-R 831.60**
	=RiskOutput("MARGIN ABOVE SPECIFIED COSTS (individual farmer)")+157+158+159+160					
m)	**GROSS MARGIN/(LOSS) ABOVE TOTAL ALLOCATABLE VARIABLE COSTS (c-k-l)**				**-R 1 092.00**	**-R 36.40**
n)	Interest on working capital (overdraft)				-R 300.00	-R 10.00
o)	Financing/rental costs	R 700	ha	1	-R 700.00	-R 23.33
p)	Regular labour costs (salaries)	R 1 500	ha	1	-R 1 500.00	-R 50.00
q)	Irrigation labour costs	R 300.00	ha	1	-R 300.00	-R 10.00
						R 0.00
r)	**MARGIN/(LOSS) ABOVE SPECIFIED COSTS (for season)**				**-R 3 892.00**	**-R 129.73**

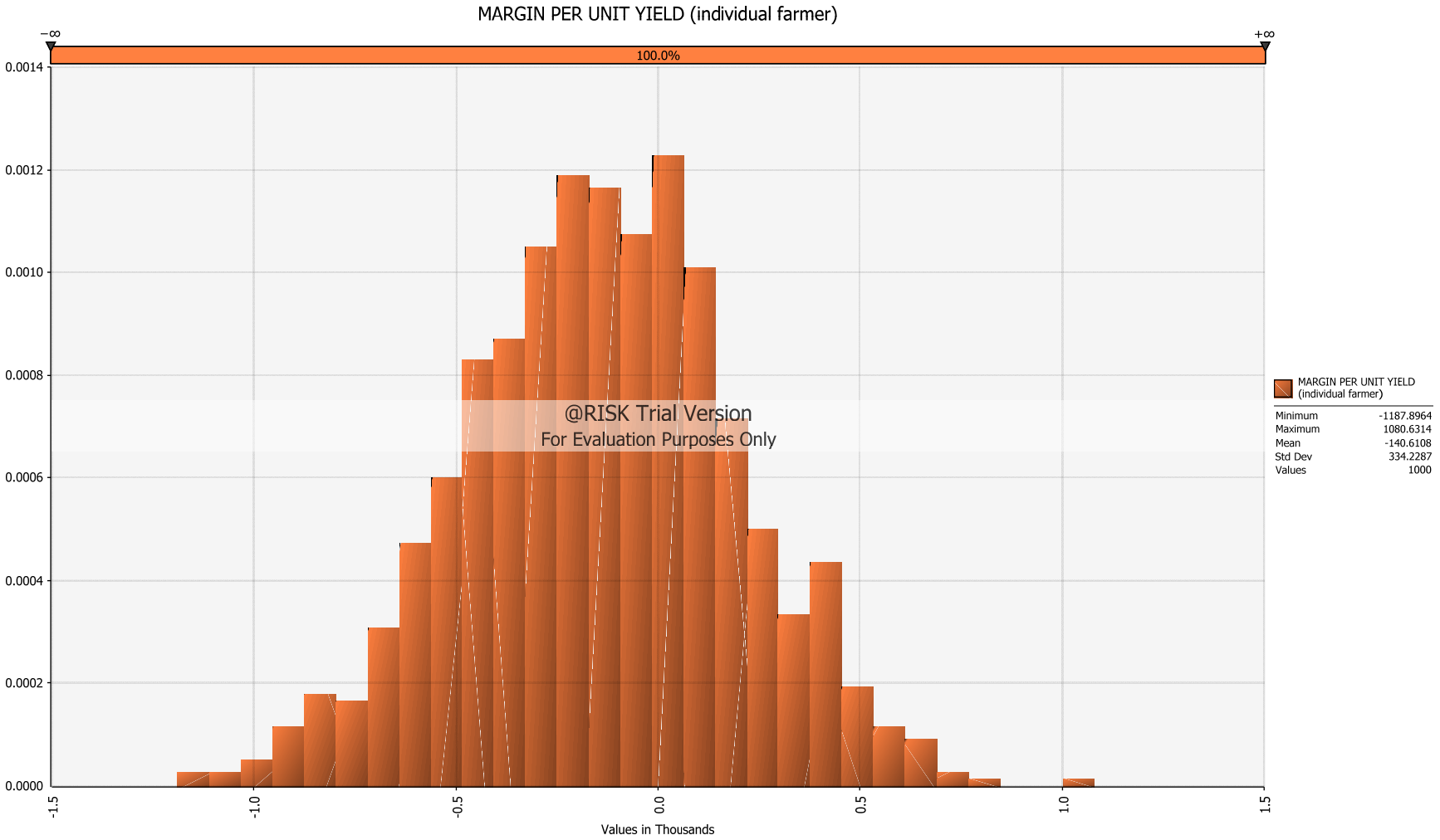


Figure 4.6 Distribution function of a simulated gross margin per tonne outcome

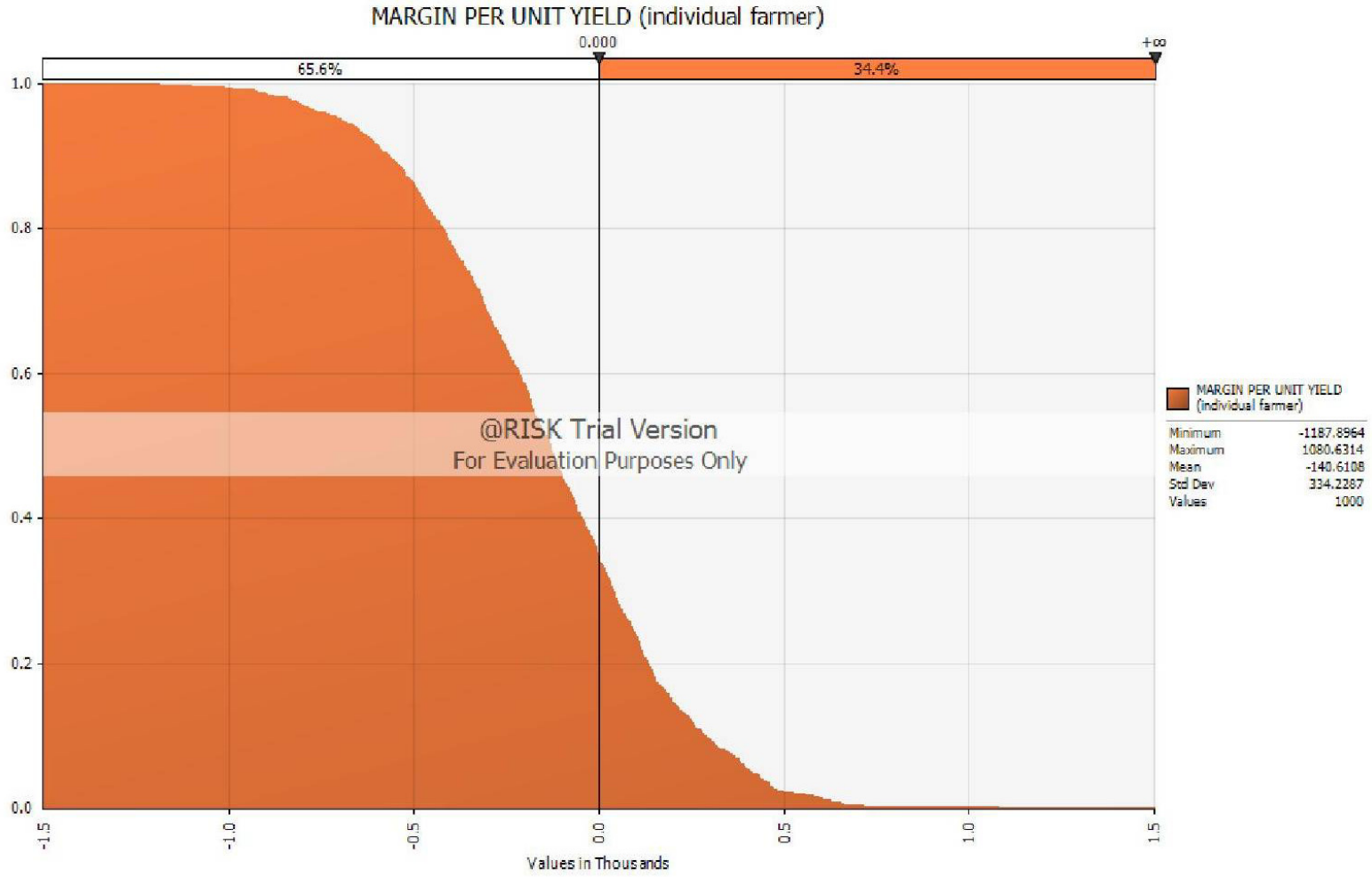


Figure 4.7 Cumulative descending probability density function of the gross margin per tonne outcome

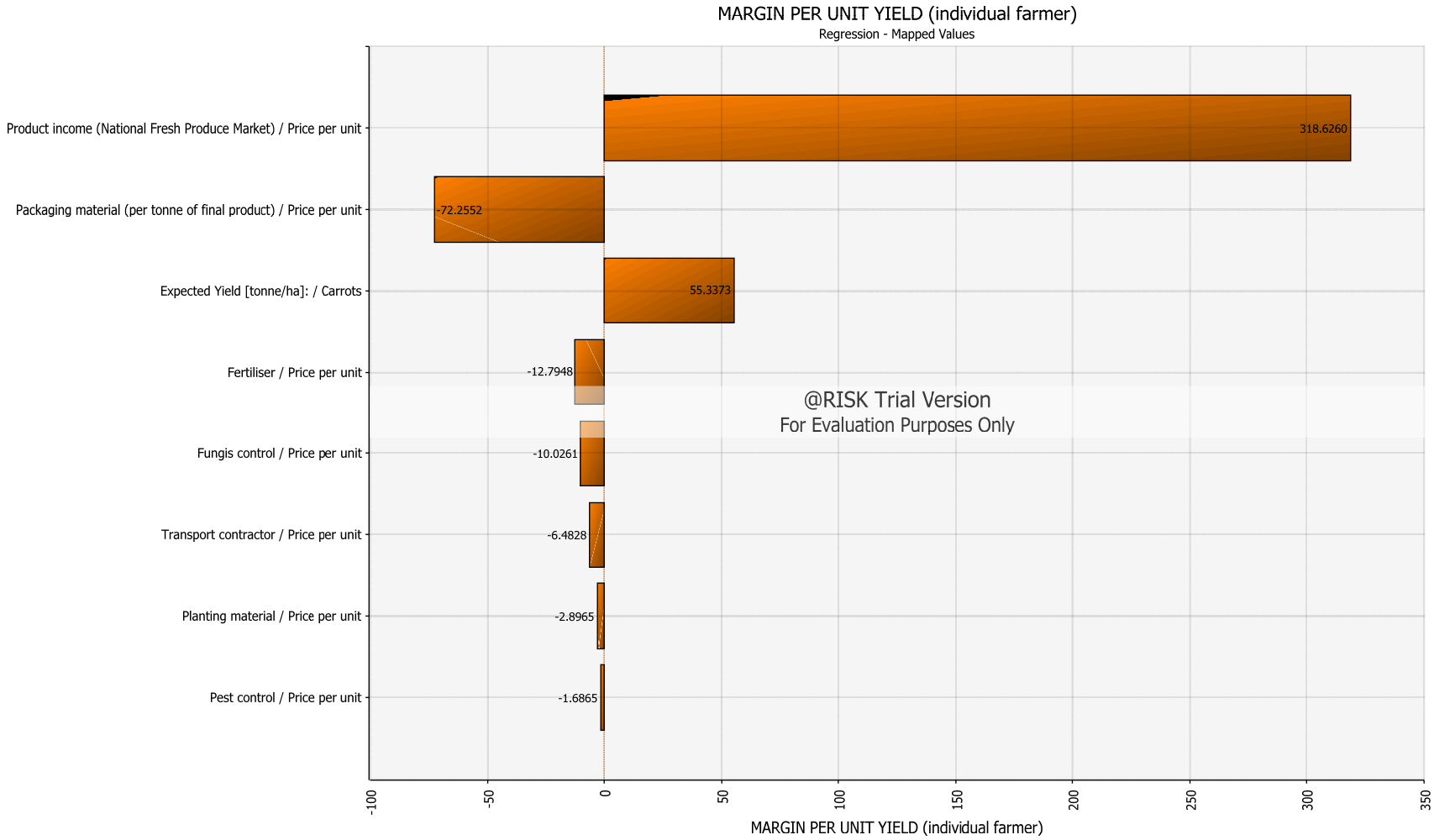


Figure 4.8 Regression chart indicating the most sensitive variables in terms of the effect on the gross margin per tonne simulation outcome

The following conclusions can be drawn from the illustrative results of the simulation in Figure 4.6 to Figure 4.8:

- The average expected gross margin (or loss, as per this example) that could be expected by this farming operation is indicated by the mean value in Figure 4.6. The mean value of the result from this 1000 iteration simulation is given as –R140,61/ha in the right hand column;
- The probability of expecting a certain gross income can be determined by shifting the delimiter line in the probability distribution function graph – the example in Figure 4.7 indicates that the probability to break even (in other words a gross margin above R0 a hectare) is 34,4% (the percentage shown at the top of the graph to the right of the delimiter);
- The effect that each variable has on the outcome of the model is illustrated in the regression chart of the simulation, as shown in Figure 4.8 in the example above. The items higher up on the list are more significant regarding their influence on the outcome of the model. The length of each bar indicates the amount of change that would result in the output for every one standard deviation of change in the input.

  Bars that lie to the right indicate variables that could improve the outcome by increasing the input (for instance higher income in this instance). Bars that lie to the left could improve the outcome by decreasing the input value (in other words savings). In the example given in Figure 4.8, the standard deviation of packaging material is R100/tonne (10% of the average retail value). According to the results of the sensitivity analysis, a saving of 1σ, thus R100/tonne, in the packaging material, could result in an improvement of R72,26/ha in the gross margin.

Now that the methodology and workings of the PCAS model, coupled with the obtainable results, have been discussed, the ability to compare different scenarios – with the assistance of modelling their expected outcomes – is discussed in the next section.

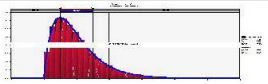
4.4.4 Using the PCAS to model potential improved competitiveness

For this part of the discussion of the PCAS, a scenario like the one discussed and modelled in the previous section, where a number of small farmers co-operate in an organised fashion and are linked to a formal market and input suppliers (the two strategies of the Framework), is modelled. The comparison of the competitiveness of the two scenarios is done through the mirroring of the PCAS sheet that was used in the previous section, coupled with some alterations that are pointed out in the discussion below. The Comparison Production Costs Analysis Sheet (CPCAS) is shown in Table 4.6, and the assumptions regarding the values on the right hand side are briefly discussed below:

- The possibility to penetrate "more sophisticated" markets, through increasing supply volumes, is indicated in the different market segments under the "Income Section" – Class I produce can achieve a higher price per tonne through these markets than through the Cape Town Market. Since contracts and prices can normally also be negotiated beforehand, the standard deviation and uncertainties regarding price fluctuations are lower;
- A mean value of R 2 750/tonne was "chosen" based on an average price of R3,60/kg charged in the supermarket, which normally includes a mark-up of between 30 and 35% (own assumptions). The standard deviation in this instance would be less than the volatility of the Fresh Produce Market. This is due to improved planning in terms of volumes ordered by the supermarket, as well as the fact that prices can be negotiated with the supermarket beforehand. The standard deviation was "chosen" (estimated) as R137,50, a 15% fluctuation either side of the mean value (own assumption);
- Class II produce can be marketed to processors who would be willing to pay a high price for their produce than that at which the products are sold for at the Market. This is due to the fact that a pre-negotiated contract would ensure them of continuous supply, and the processor would save time and money by not having to visit the Market to source produce. A mean value of processing grade produce was chosen as R2 000 (about a 10% premium on the average price that products are sold for at the Market), with a standard deviation of R100, allowing for an average price fluctuation of 15% around the mean value;

Table 4.6 CPCAS with inputs for an individual farmer and proposed collective action scenario

ASSUMPTIONS



Expected Packout:	
Class I (% of total yield)	20%
Class II (% of total yield)	54%
Class III (% of total yield)	26%
Product:	**Carrots**
Expected Yield [tonne/ha]:	**30**

ASSUMPTIONS

Total overheads per month	R 300 000	
Thus overheads per 4 month season	R 1 200 000	
Total members	35	
Total membership hectares	100	ha
Average ha per member	2.86	ha

Expected Packout:	
Class I (% of total yield)	20%
Class II (% of total yield)	54%
Class III (% of total yield)	26%
Product:	**Various**
Expected Yield [tonne/ha]:	**30**

Individual small farmer scenario

		Price per unit	Unit	Quantity per ha	Return/(Cost) per ha per season	Value per yield unit
a)	**GROSS INCOME**				**R 39 744.00**	**R 1 324.80**
	Class I and II income (National Fresh Produce Market)	R 1 800.00	tonne	22.08	R 39 744.00	R 1 324.80
	Class III income (iminimal thus excluded)					
b)	**MARKETING COSTS**				**-R 4 968.00**	**-R 165.60**
	Market and agent commision (fixed)	12.5%		R 39 744.00	-R 4 968.00	-R 165.60
c)	**GROSS INCOME minus MARKETING COSTS (a-b)**				**R 34 776.00**	**R 1 159.20**
d)	**ALLOCATABLE VARIABLE COSTS (e+f)**				**-R 33 898.00**	**-R 1 129.93**
e)	**Pre-harvest cost**				**-R 9 050.00**	**-R 301.67**
	Fertiliser	R 4 000.00	/tonne	1	-R 4 000.00	-R 133.33
	Fungis control	R 3 000.00	/litre	1	-R 3 000.00	-R 100.00
	Pest control	R 150.00	/litre	2	-R 300.00	-R 10.00
	Weed control	R 250.00	/litre	1	-R 250.00	-R 8.33
	Planting material	R 250.00	/kg	4	-R 1 000.00	-R 33.33
	Water rights	R 500.00	/ha	1	-R 500.00	-R 16.67
	Other					
	Other					
	Other					
	Other					
f)	**Harvest costs**				**-R 24 848.00**	**-R 828.27**
	Casual labour	R 7.00	/hour	80	-R 560.00	-R 18.67
	Packaging material (per tonne of final product)	R 1 000.00	/tonne	22.08	-R 22 080.00	-R 736.00
	Transport contractor	R 10.00	/km	220.8	-R 2 208.00	-R 73.60
	Other					
	Other					
g)	**GROSS MARGIN/(LOSS) ABOVE DIRECTLY ALLOCATABLE VARIABLE COSTS (c-d)**				**R 878.00**	**R 29.27**
h)	**INDIRECTLY VARIABLE COSTS (i+j)**				**-R 1 970.00**	**-R 65.67**
i)	**Pre-harvest cost**				**-R 1 870.00**	**-R 62.33**
	Depreciation				-R 400.00	-R 13.33
	Fuel costs				-R 600.00	-R 20.00
	Insurance and license costs				-R 70.00	-R 2.33
	Interest costs				-R 350.00	-R 11.67
	Maintenance and repair costs				-R 450.00	-R 15.00
j)	**Harvest costs**				**-R 100.00**	**-R 3.33**
	Depreciation				**R 20.00**	R 0.67
	Fuel costs				-R 60.00	-R 2.00
	Insurance and license costs				-R 10.00	-R 0.33
	Interest costs				-R 20.00	-R 0.67
	Maintenance and repair costs				-R 30.00	-R 1.00
k)	**TOTAL PRE-HARVEST COSTS (e+i)**				**-R 10 920.00**	**-R 364.00**
l)	**TOTAL HARVEST COSTS (f+j)**				**-R 24 948.00**	**-R 831.60**
m)	**GROSS MARGIN/(LOSS) ABOVE TOTAL ALLOCATABLE VARIABLE COSTS (c-k-l)**				**-R 1 092.00**	**-R 36.40**
n)	Interest on working capital (overdraft)				-R 300.00	-R 10.00
o)	Financing/rental costs	R 700	ha	1	-R 700.00	-R 23.33
p)	Regular labour costs (salaries)	R 1 500	ha	1	-R 1 500.00	-R 50.00
q)	Irrigation labour costs	R 300.00	ha	1	-R 300.00	-R 10.00
						R 0.00
r)	**MARGIN/(LOSS) ABOVE SPECIFIED COSTS (for season)**				**-R 3 892.00**	**-R 129.73**

Small farmer part of collective action scenario

		Price per unit	Unit	Quantity per ha	Return/(Cost) per ha per season	Value per tonne yield
aa)	**GROSS INCOME**				**R 49 429.50**	**R 1 647.65**
	Class I income (to supermarkets)	R 2 750.00	tonne	5.97	R 16 417.50	R 547.25
	Class II income (to processors/informal trade/wholesale)	R 2 000.00	tonne	16.11	R 32 220.00	R 1 074.00
	Class III income (to processors)	R 100.00	tonne	7.92	R 792.00	R 26.40
bb)	**MEMBERSHIP FEES (overheads/total membership ha)**				**-R 12 000.00**	**-R 400.00**
	(Based on 100 ha total production members)	R 12 000.00	ha	1.00	-R 12 000.00	-R 400.00
cc)	**GROSS INCOME minus MEMBERSHIP FEES (aa-bb)**				**R 37 429.50**	**R 1 247.65**
dd)	**ALLOCATABLE VARIABLE COSTS (ee+fff)**				**-R 33 156.00**	**-R 1 105.20**
ee)	**Pre-harvest cost (based on bulk sourcing)**				**-R 8 620.00**	**-R 287.33**
	Fertiliser	R 3 800.00	/tonne	1	-R 3 800.00	-R 126.67
	Fungis control	R 2 850.00	/litre	1	-R 2 850.00	-R 95.00
	Pest control	R 140.00	/litre	2	-R 280.00	-R 9.33
	Weed control	R 238.00	/litre	1	-R 238.00	-R 7.93
	Planting material	R 238.00	/kg	4	-R 952.00	-R 31.73
	Water rights	R 500.00	/ha	1	-R 500.00	-R 16.67
	Other					
	Other					
	Other					
	Other					
ff)	**Harvest costs**				**-R 24 536.00**	**-R 817.87**
	Casual labour	R 7.00	/hour	80	-R 560.00	-R 18.67
	Packaging material (per tonne of final product)	R 950.00	/tonne	22.08	-R 20 976.00	-R 699.20
	Contribution towards co-operative transport	R 3 000.00	total cost/total	1	-R 3 000.00	-R 100.00
	Other					
	Other					
gg)	**GROSS MARGIN/(LOSS) ABOVE DIRECTLY ALLOCATABLE VARIABLE COSTS (cc-dd)**				**R 4 273.50**	**R 142.45**
hh)	**INDIRECTLY VARIABLE COSTS (ii+jj)**				**R 0.00**	**R 0.00**
ii)	**Pre-harvest cost (contributions included in membership fees - part of overheads)**				**R 0.00**	**R 0.00**
	Depreciation					
	Fuel costs					
	Insurance and license costs					
	Interest costs					
	Maintenance and repair costs					
jj)	**Harvest costs (contributions included in membership fees - part of overheads)**				**R 0.00**	**R 0.00**
	Depreciation					
	Fuel costs					
	Insurance and license costs					
	Interest costs					
	Maintenance and repair costs					
kk)	**TOTAL PRE-HARVEST COSTS (ee+ii)**				**-R 8 620.00**	**-R 287.33**
ll)	**TOTAL HARVEST COSTS (ff+jj)**				**-R 24 536.00**	**-R 817.87**
mm)	**GROSS MARGIN/(LOSS) ABOVE TOTAL ALLOCATABLE VARIABLE COSTS (cc-kk-ll)**				**R 4 273.50**	**R 142.45**
nn)	Interest on working capital	R 300.00			-R 300.00	R 10.00
oo)	Financing/rental costs	R 700	ha	1	-R 700.00	-R 23.33
pp)	Regular labour costs (salaries)	R 1 500.00	ha	1	-R 1 500.00	-R 50.00
qq)	Irrigation labour costs	R 300.00	ha	1	-R 300.00	-R 10.00
rr)	**MARGIN/(LOSS) ABOVE SPECIFIED COSTS (for season)**				**R 1 473.50**	**R 69.12**

- Class III products that have been removed from the overall harvest can also be marketed to certain processors, or be sold as animal feed or for composting, with a small income of about R100/tonne and a large standard deviation of R20/tonne (own assumptions);
- No marketing fees or commissions would be applicable in this scenario, since produce is not marketed through the National Fresh Produce Marketing System. However, members that are part of the cluster (co-operative), would be liable for a membership fee to cover the total overheads of the company, including salaries for the co-ordination of the business, the rental of facilities, operational costs pertaining to the packing and distribution facility, marketing costs and other office costs. The total overheads in this example were estimated at R300 000 a month[21] (with a standard deviation of R30 000 month), which equals R1,2 million for a growing season of 4 months. Therefore, if the co-operative had 100 hectares, each ha would, on average, have to contribute R12 000 per ha per season to the company for running costs and co-ordination of marketing;
- The rest of expenses on the *collective action scenario side* of the sheet are based on the same information as previously discussed, with the following exceptions:
    - A discount of at least 5% on retail prices of input costs was assumed, based on bulk discount;
    - It was assumed that, because the co-operative would be linked to specific, larger suppliers, and produce would be sourced directly from these suppliers in large volumes (versus sourcing small volumes in the retail market), the price fluctuations would be less than the chosen value for the individual farmer scenario. The standard deviation of input costs was chosen as 0,05μ, which considers fluctuations of about 15% on either side of the mean value.
    - The various pre- and post-harvest costs have been included in the overhead and contribution towards co-operative transport costs.

[21] The estimated overhead costs for a typical co-operative consisting of 100 ha is based on typical figures from other agri-businesses that have been analysed and designed by MBB in the past, and consist of:

Rental and facility expenses of	R30 000/month
Other operational expenses of the facility, including salaries	R140 000/month
Co-ordination and marketing	R50 000/month
Admin, insurance and license, interest and other costs	R50 000/month
Contingencies and unforeseen expenses	R30 000/month
	R300 000/month

However, these calculations should only be seen as illustrative for the purpose of explaining the working of the PCAS

The results from the simulation model on the right hand side of the PCAS are shown in Figure 4.9 to Figure 4.11. Running a simultaneous simulation on the two scenarios, the overlaid distribution functions of the expected outcomes in Figure 4.12 and Figure 4.13 indicate the probability of improved competitiveness of the collective action scenario, based on the inputs and assumptions provided. The results of these graphs will not be discussed in detail, but the conclusions that could be drawn from them are briefly discussed in the next section as concluding remarks on the capability of the PCAS.

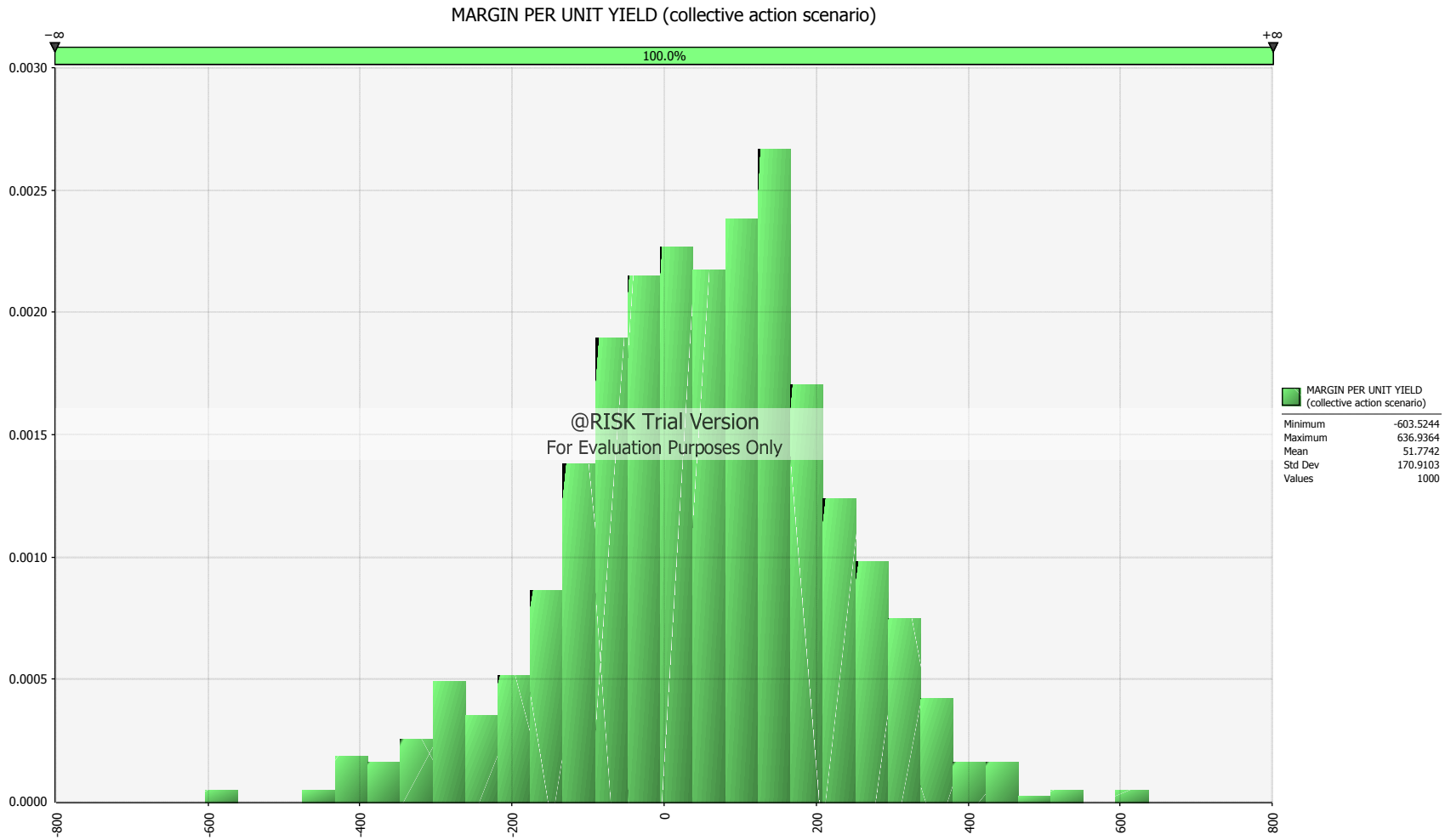


Figure 4.9 Distribution function of a simulated gross margin per tonne outcome for a collective action scenario

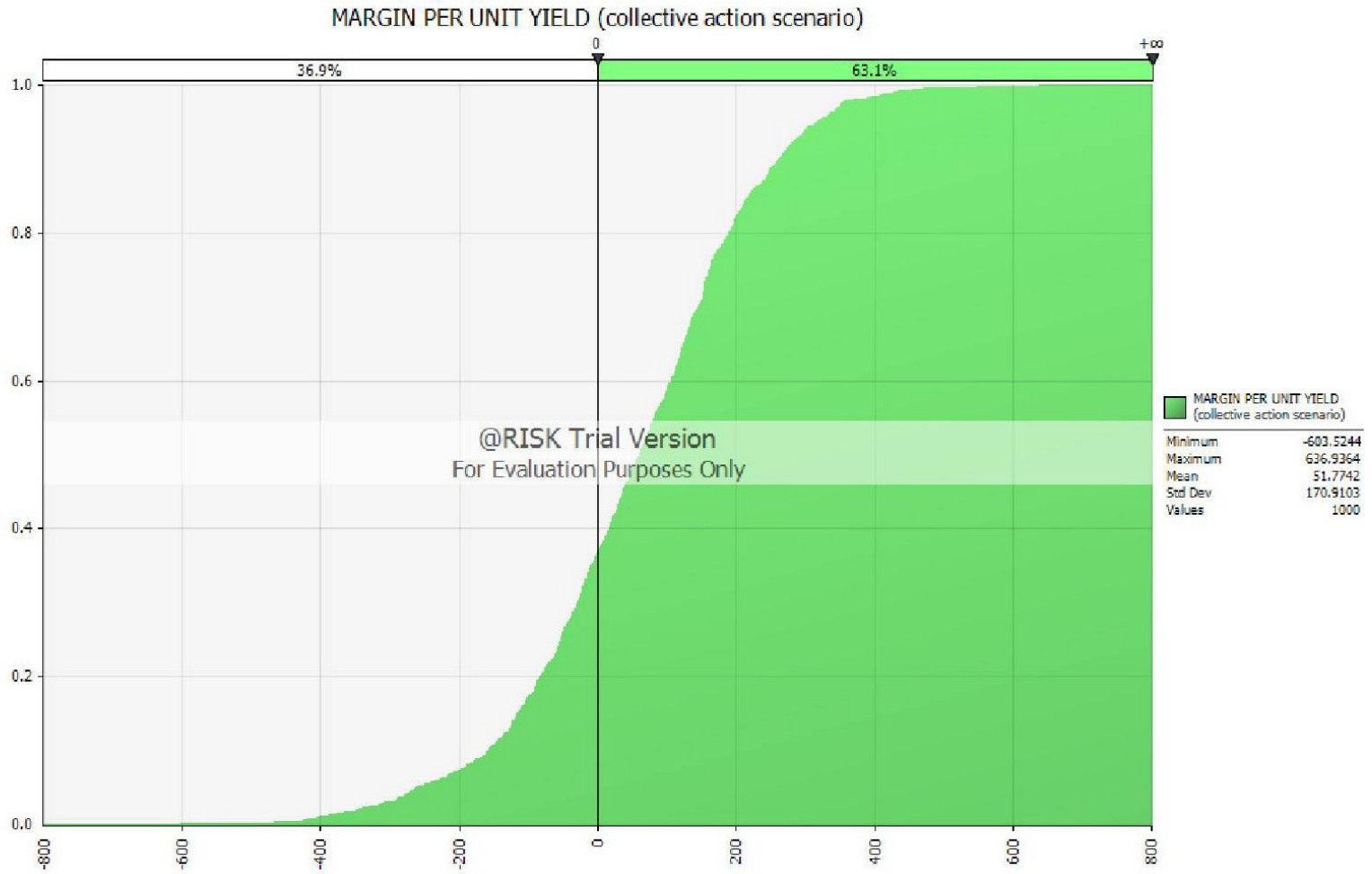


Figure 4.10 Cumulative ascending probability density function of a simulated gross margin per tonne outcome for a collective action scenario

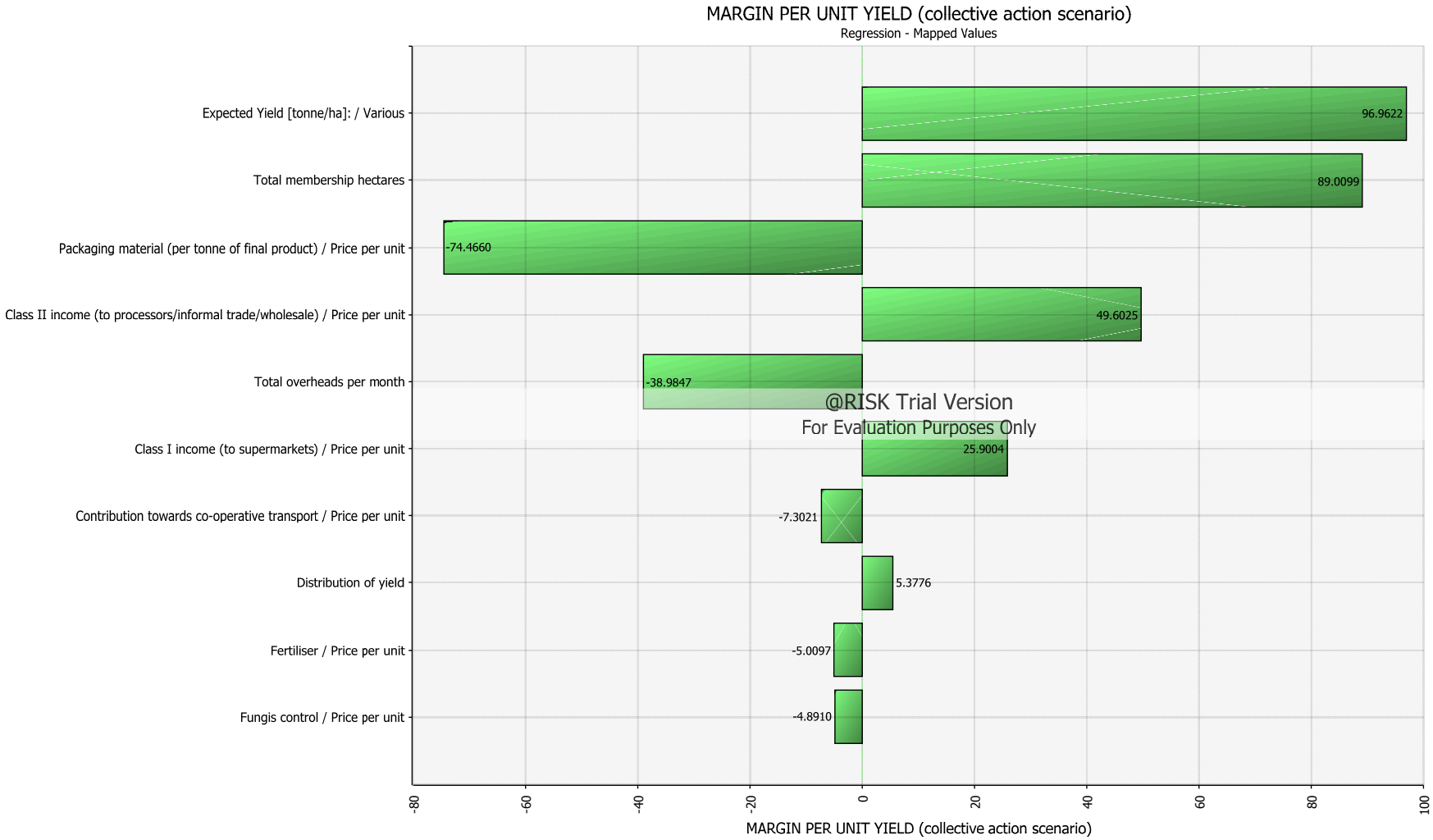


Figure 4.11 Regression chart for a simulated gross margin per tonne outcome for a collective action scenario

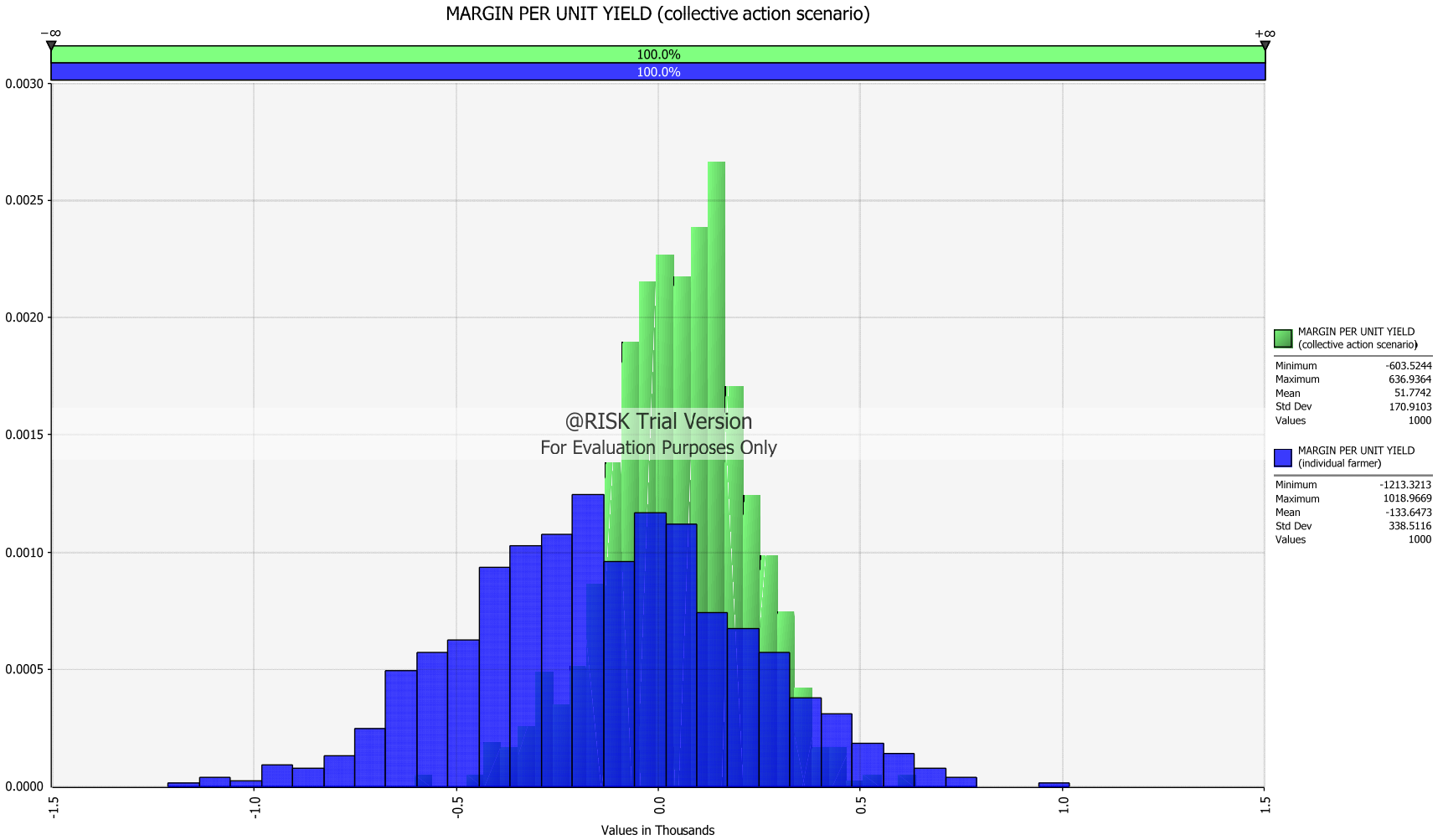


Figure 4.12 Overlaid distribution functions for the expected gross margin per tonne outcomes of the individual farmer scenario (dark/blue) vs the collective action scenario (light/green)

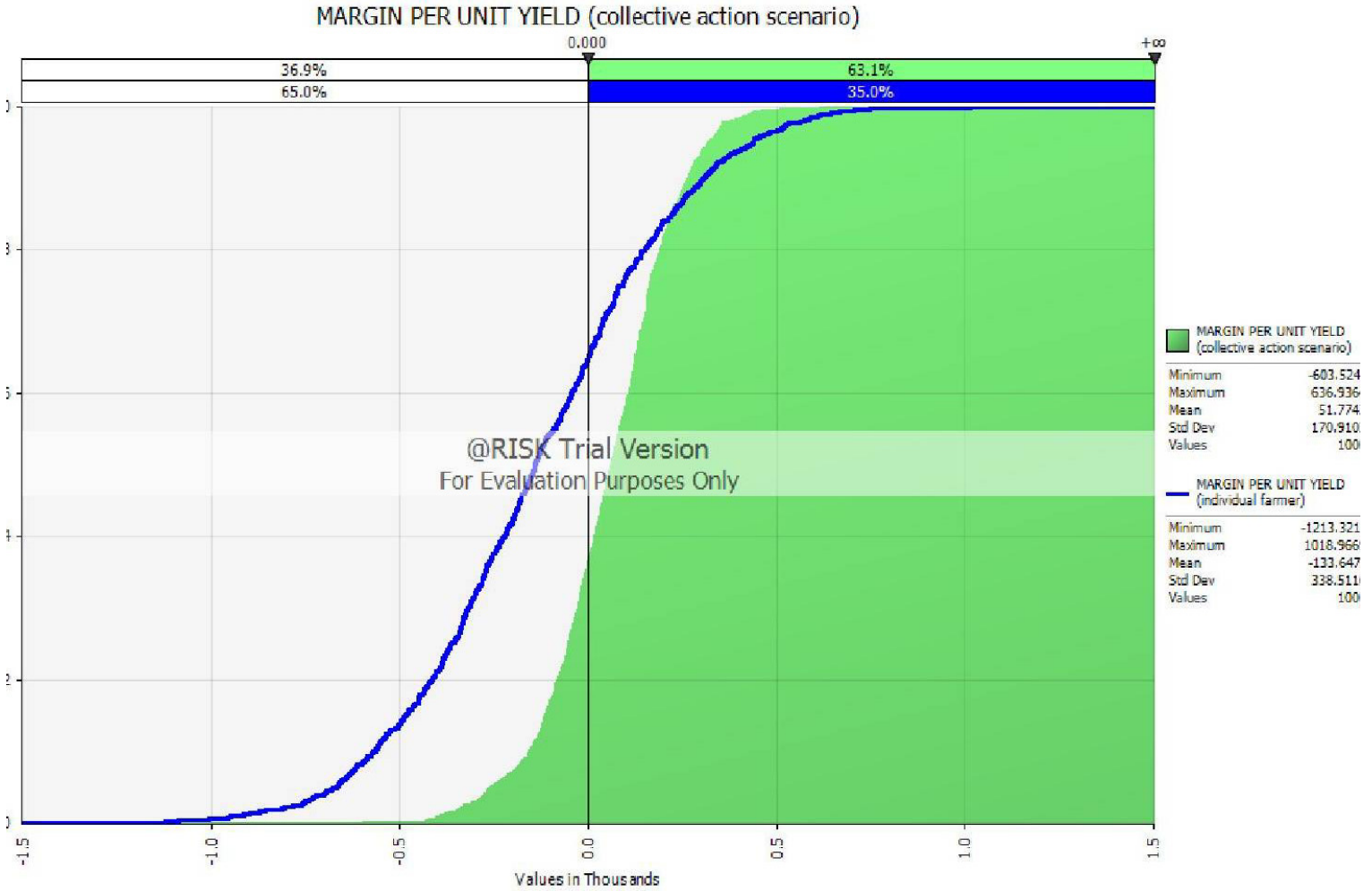


Figure 4.13 Overlaid cumulative ascending probability density function of the simulated gross margin per tonne outcomes of the individual farmer scenario (dark/blue) vs the collective action scenario (light/green)

4.4.5 Notes on assumptions and results of the PCAS example

A number of assumptions were made in the example used to describe the working of the PCAS model. The assumptions for the individual farmer case were obtained from historical market data and data from the COMBUD planning guides, and the assumptions for the collective action scenario were estimates made from observations within the agriculture field, as well as estimates on what realistic figures could be if the collective action organisation was seen as a commercial farming unit. These assumptions were made in order to discuss and illustrate the workings of the PCAS model, and the results should therefore not be interpreted at this stage of the study.

However, the following observations from the "results" of this example can be made towards concluding this discussion regarding the PCAS model that was developed:

- The results of the simulated outcomes, which can be read from the graphs in Figure 4.12, indicate that a farmer who is part of a collective action scenario could improve a gross loss situation from an average loss of about R133,65/tonne to an average gross margin of about R51,77/ha. These values can be related to the margin achievable per ha by multiplying them with the average yield that is expected in both scenarios as indicated in Table 4.6 (-R133,65 x 30 tonnes/ha = -R4 009,50/ha, R51,77 x 30 tonnes/ha = R1 553,10/ha);
- The R4 009 loss per ha for the individual farmer scenario, is based on the assumption that the farmer would apply all the inputs as described in the Excel sheet of this example. This may not necessarily be the case for a real life resource poor farmer – in fact, the absence of the appropriate inputs is one of the reasons why the yield and quality of these farmers are low, and the reductions in such costs could reduce the expenses, which would improve the average gross margin;
- The projected average gross margin of R1 553,10/ha for the collective action scenario is a 3,15% margin on turnover, which is higher than the expected results of the individual farmer, yet less than the 5 to 10% margin which commercial farmers regard as an average return. However, 3,15% is a realistic figure in the circumstances that were assumed for this example.

- The graphs in Figure 4.13 indicate the probability for the respective scenarios to break even – the individual farmer (based on the assumptions made in this example) has a 35% chance of attaining a gross margin of above R0/ha, while the collective action scenario has a 63,1% chance;
- The margins calculated in the COMBUD guides differ from the ones modelled through the PCAS. This can be attributed to the fact the COMBUD has omitted some common expenses that are normally associated with agriculture, as well as the fact that the income projection for carrots on the Market used in COMBUD is not realistic when considering a long term average of the Cape Town Market price over the past two-plus years.

The PCAS is a model utilising the basic elements of the COMBUD sheet in conjunction with simulation techniques, with an uncomplicated interface (Excel) in order to generate information on competitiveness. The determination of the competitiveness of farmers PCAS is based on the theory that improved gross margins equal improved competitiveness. Anticipated gross margins can be simulated through using the PCAS, based on various variables inputs and key success factors for improving competitiveness can also be identified.

The PCAS thus has the ability to potential addresses two shortcomings of the COMBUD sheet – it considers the typical variability of agricultural costs and food prices, generating likely outcomes in the form of probabilities, and it can be utilised to improve competitiveness, not only to plan production based on typical values.

4.5 Summary and conclusion

In this chapter, the production cost analysis method was chosen as the most appropriate measure of competitiveness of small farmers. An existing model, the COMBUD production planning guide (which estimates production costs and potential margins for specific crops in specific climatic regions) was identified as a starting point in the development of a sheet for the calculation, comparison and simulation of production costs.

Although the COMBUD calculation sheets are only used as planning guidelines, a modified version of the calculation sheet was developed to create a Production Costs Analysis Sheet [PCAS], which enables the measurement of competitiveness through the simulation of expected outcomes, based on variable inputs. The PCAS provides interactive feedback in the form of probability density function distributions, which can be used to determine the probability of specific outcomes. It also provides regression charts that result in a sensitivity analysis, through which the variable items with the biggest influence on the gross margin can be identified.

A side-by-side CPCAS can be used to analyse the potential impact of alterations and strategies on the competitiveness of a farmer, and to compare different scenarios. The overlaying of distribution functions and probability density function distributions from the two scenarios provide visual and interactive feedback in terms of the probability of the various likely outcomes that could be expected.

Through means of a “case study” to explain the workings of the PCAS, the simulation model’s results have been found to be suitable for the comparison of the competitiveness of an individual small farmer, with that of the same farmer as part of a cluster of farmers linked to a market. Therefore the PCAS is capable of assisting in the analysis of a farmer or farming industry, the identification of potential key success factors of the industry, and to model the likely outcomes that could be expected through the implementation of collective action and/or supply chain development strategies.

CHAPTER FIVE

THE DEVELOPMENT OF A CONCEPTUAL FRAMEWORK

5.1 Introduction

The objectives of the previous three chapters were to investigate previous works regarding the improved competitiveness of small firms, and to develop a model to measure the competitiveness of firms in the resource poor agricultural sub-sector of South Africa. The purpose of this chapter is to develop a conceptual framework from the conclusions and findings of the different models that have been investigated in this study.

This chapter thus serves as a preliminary conclusion to the study, consolidating the findings, tools and appropriate models that were investigated into a single, logical, sector-specific framework for resource poor farmers in South Africa.

5.2 Components of the Framework

In the second chapter of this study it was established that the marketing of fresh produce is one of the most critical elements in the horticultural value chain. Furthermore, it became clear that very specific market segments for fresh produce exist in South Africa, each with its own quality and price criteria. However, small-scale and resource poor farmers struggle to supply any formal market in South Africa successfully on a sustainable basis. In order to improve the supply from small farmers, the following needs to be achieved:

- The quality of produce from resource poor farmers should increase;
- The volumes of produce that resource poor farmer produce should increase;
- The production criteria should be addressed to adhere to Good Agricultural Practices;

- To reduce risks, farmers should aim to produce for a specific, pre-negotiated market (farmers should be linked to a market);
- To farm profitably (to get out of the "resource poor" situation), produce should be sold at prices higher than the total cost of production. In this regard yields should increase, higher value markets should be penetrated or input costs should be decreased.

Realistically, small farmers can only achieve the above if their economies of scale are increased, which would enable suppliers to offer better prices and services to the farmers, and would interest bigger formal buyers to enter into negotiations with them. Previous works on the organisation of small farmers into clusters, and the organisation of the agri-food value chain for resource poor farmers, were investigated as possible solutions to increase small farmers' economies of scale and market access.

The findings of the literature study on previous works indicate that a *value chain analysis* provides insight into an industry, and assists in the identification of the different role players and processes that influence and add value to the final product of the value chain. The optimisation of the flow of inputs and processes, as well as the potential linkages and relationships that should be improved on or added to a chain, can be identified once a value chain has been drawn up.

The conclusion from the discussions of different *collective action* and *clustering* models, as well as the case studies of the successful implementation of small farmer co-operations, is that horizontal co-operation (collective efficiency and clustering) and vertical organisation (development of value chains) are feasible strategies for establishing the improved competitiveness of small farmers. Both the value chain and cluster analyses can therefore be used as tools to identify key success factors for improved competitiveness in this sector.

The first step of the Framework, however, should entail the definition of the boundaries of the analysis area This is due to the fact that any strategy based on the clustering of farmers and suppliers would be area-specific and focused as a result of the close proximity of participants required for clustering. A quick survey or an investigation into the area could identify the "focus area", and interviews with some of the farmers could assist to define a

logical and potentially feasible cluster unit. The focus area could be refined once more knowledge has been gained in the next step of the Framework.

This step would involve gaining an understanding of the focus area, the different role players and the markets that exist. This could be done through a value chain analysis with the assistance of the local farmers and investigations. A number of different guidelines are available to assist with the value chain analysis process, and the proposed steps of such a process were construed in this study from the culmination of five different works. The competitiveness of a sample of farmers in the study could then be calculated with the help of the Production Costs Analysis Sheet (PCAS) that was developed as part of this study.

After the value chain has been drawn up and the competitiveness and sensitivity analysis of the PCAS has been completed, key success factors could be identified through the results of the sensitivity analysis, as well as by doing a cluster analysis on the industry with the assistance of the *determinants of competitiveness* from *Porter's diamond* model. A table with generic determinants and factors that influence the competitiveness of South African Agriculture, based on Porter's (1998) and Esterhuizen, Van Rooyen and D' Haese's (no date) works, is available to examine the industry.

The next step involves the development of a draft strategy from the data that was determined during the previous steps. The different role players, including each individual's role and responsibilities, should also be determined through work sessions. In order to test the potential improvement and impact that the draft strategy could have on the competitiveness of the farmers in the focus area, the Comparison Production Cost Analysis Sheet should be completed. The draft strategy and the anticipated results should then be discussed with the different role players in a workshop to refine the strategy and to gain buy-in and commitment, after which the strategy could be implemented.

The Framework for the development of strategies for the improved competitiveness amongst small-scale, resource poor farmers therefore consists of the aforementioned steps as described above. These can be summarised into the following four-step process:

- Definition and investigation stage
- Analysis stage
- Development stage
- Implementation stage

The Framework, its' stages, descriptions of the processes within each stage and the mechanisms through which the processes could take place, are illustrated in Table 5.1 overleaf.

Table 5.1 The Framework for improved competitiveness of small farmers

STAGE		PROCESS	MECHANISM
STEP I DEFINE	a)	Define a focus area and logical cluster unit	Investigations Interviews
STEP II ANALYSE	b)	Identify potential role players and stakeholders (including potential partners, markets, infrastructure (existing and required) and other linkages)	Value Chain Analysis
	c)	Determine the competitiveness of a sample of individual farmers that are part of the focus area	Production Cost Analysis Sheet
	d)	Determine the potential *key success factors* and items that could be focused on to improve competitiveness	Key success factor identification for all six determinants of Porter's Diamond through cluster analysis and analysis of major determinants (Table 3.1) Production Cost Analysis Sheet sensitivity analysis
STEP III DEVELOP	e)	Develop a *draft strategy* based on the preceding analysis, including addressing the *critical items* (Management/mentoring, loyalty of members and performance by Government)	Data from Step II Work sessions
	f)	Define the roles and responsibilities of all stakeholders and role players	Work sessions
	g)	Determine the potential for improved competitiveness due to the strategy that was developed, including a sensitivity analysis	Comparison Production Cost Analysis Sheet
	h)	Discuss the draft strategy with stakeholders for inputs and refinements	Work sessions
STEP IV IMPLEMENT	i)	Obtain buy-in and commitment from farmers, start with production planning and scheduling process and implement the refined strategy	Work sessions Physical implementation

5.3 Summary and conclusion

The Framework that was developed through this study represents the logical process that could be followed during the planning and strategising stage of small farmer projects. The Framework makes use of existing models, processes and mechanisms that have been applied within the agricultural or manufacturing industries before, as well as a modified version of a production cost planning guide to measure competitiveness in terms of production costs.

The penultimate chapter that follows outlines the results from an implementation of the Framework amongst a group of farmers in Cape Town in the form of a case study.

CHAPTER SIX

FRAMEWORK IMPLEMENTATION CASE STUDY

6.1 Introduction

The suitability of the Framework that was developed in the previous chapter was tested through the implementation thereof amongst a group of small farmers in the Philippi horticultural and surrounding areas of the City of Cape Town in 2008. Although the Framework has not been applied completely at the time of writing, the results and conclusions from the implementation of most of the steps are discussed in this chapter.

6.2 Stage one: Definition and investigation

A project for testing the Framework was identified through the author's involvement as a consultant in the management of the Philippi Fresh Produce Market in Cape Town. The Philippi Market was constructed with a drive to mobilise a supply of fresh produce from the emerging farmers of the Western Cape, but since the Market's inception in September 2006, the farmers that were identified to supply the Market have been struggling to do so (or to supply any formal market for that matter). The only farmers that have supplied the Market consistently have been of the large-scale, commercial variety, and buyers at the Market had given up on trying to procure fresh produce from small farmers.

One of the founding partners of the Market, the Department of Agriculture, was approached to discuss the potential of developing a strategy for the improved competitiveness of the small farmers surrounding the Market. According to the field officers of the Philippi office of the Department of Agriculture, the farmers of this area struggle to market their produce to formal markets, except to the Cape Town National Fresh Produce Market (previously known as Epping National Fresh Produce Market), where they have to pay a significant agent and

market commission. Their produce also does not sell well compared to that of commercial farmers who supply the market in large volumes.

The Department's extension officers assisted by inviting a group of 20 farmers (with land of between 0,1 ha and 5 ha each) from this area for a work session on 19 June 2008. The approximate locality of the farmers (from the pilot study area) that attended the workshop is illustrated in figure 6.1.

Figure 6.1 Approximate location of implementation study
(Source: *Google Earth*)

6.3 Stage two: Analysis

6.3.1 The Measurement of competitiveness

One of the challenges of implementing the Framework, was to gather useful and accurate production cost and yield data. One of the project managers of a small-scale farming project near the Philippi Market, producing lettuce on a 0,8 ha plot, was able to provide figures regarding their input cost and typical yields. The yields and price information that was

provided correlated with benchmark figures (as per table 4.3) and historical Cape Town Market price data (Figure 6.2)

The graph in Figure 6.2 represents the average price for "ungraded" lettuce at Cape Town Market for the period March 2005 until December 2008, which is the data that was publicly available from the electronic Freshmark IT system database. Since the data was only obtainable in the form of a graph, the mean value and standard deviation were estimated using the same methods as described in §4.5.1 of this study.

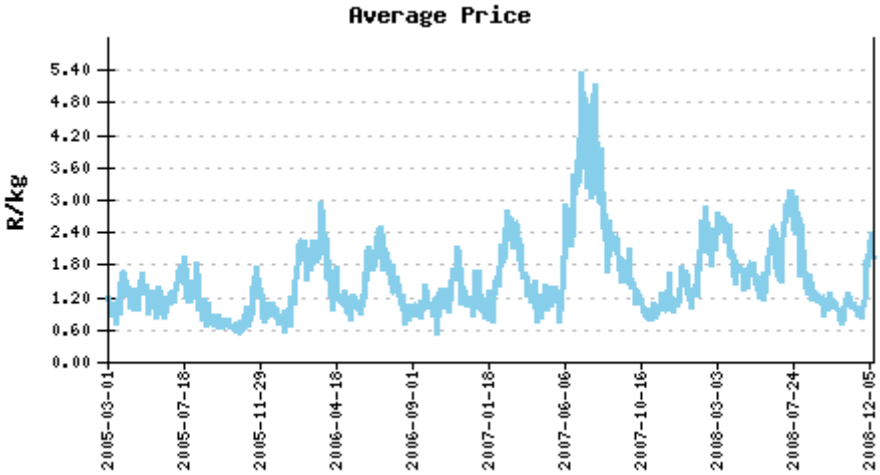


Figure 6.2 Average prices for ungraded lettuce sold at Cape Town National Fresh Produce Market – March 2005 until December 2008
(Source: www.technofresh.co.za)

The mean and standard deviation of the data set is estimated as being the following:

μ = ±R2,00/kg = R2 000/tonne

3σ = ± R1,40/kg = R1 400/tonne

thus σ = ±R0,47 = R470/tonne

It can be accepted that the above estimations are not 100% accurate (especially considering the erratic data between June and October 2007), but it would be sufficient to determine the competitiveness of the farming operation. Similar to the example in chapter four, the anticipated input costs could be modelled as a normal distribution with a mean of the

average retail price, and a standard deviation of 0,1μ (which relates to a fluctuation of 30% to either side of the mean value).

To investigate the effect of the efficiency of the casual labour, the hours required per ha per casual labourer are included as a normal distributed variable in the simulation. The PCAS sheet and results from the Monte Carlo simulation of variables are illustrated in

Table 6.1 and from Figure 6.3 to Figure 6.5.

Table 6.1 PCAS of current production costs information for individual farmer

ASSUMPTIONS							
					Expected Packout:		
					Class I (% of total yield)		50%
					Class II (% of total yield)		30%
					Class III (% of total yield)		20%
					Product:		Lettuce
					Expected Yield [tonne/ha]:		30
Individual small farmer scenario							
		Price per unit	Unit	Quantity per ha	Return/(Cost) per ha per season	Value per yield unit	
a)	GROSS INCOME				R 48 000.00	R 1 600.00	
	Product income (Class I&II - Market)	R 2 000.00	tonne	24.00	R 48 000.00	R 1 600.00	
b)	MARKETING COSTS				-R 6 000.00	-R 200.00	
	Market and agent commision (fixed)	12.5%		R 48 000.00	-R 6 000.00	-R 200.00	
c)	GROSS INCOME minus MARKETING COSTS (a-b)				R 42 000.00	R 1 400.00	
d)	ALLOCATABLE VARIABLE COSTS (e+f)				-R 21 262.50	-R 708.75	
e)	Pre-harvest cost				-R 12 375.00	-R 412.50	
	Fertiliser	R 600.00	/m²	15	-R 9 000.00	-R 300.00	
	Planting material	R 1.50	/kg	250	-R 375.00	-R 12.50	
	Pest control	R 200.00	/litre	15	-R 3 000.00	-R 100.00	
f)	Harvest costs				-R 8 887.50	-R 296.25	
	Casual labour	R 6.25	/hour	350	-R 2 887.50	-R 96.25	
	Transport contractor	R 10.00	/km	600	-R 6 000.00	-R 200.00	
g)	GROSS MARGIN/(LOSS) ABOVE DIRECTLY ALLOCATABLE VARIABLE COSTS (c-d)				R 20 737.50	R 691.25	
h)	INDIRECTLY VARIABLE COSTS (i+j)				-R 3 000.00	-R 100.00	
i)	Pre-harvest cost (allow for)				-R 1 500.00	-R 50.00	
	Depreciation				-R 300.00	-R 10.00	
	Fuel costs				-R 300.00	-R 10.00	
	Insurance and license costs				-R 300.00	-R 10.00	
	Interest costs				-R 300.00	-R 10.00	
	Maintenance and repair costs				-R 300.00	-R 10.00	
j)	Harvest costs (allow for)				-R 1 500.00	-R 50.00	
	Depreciation				-R 300.00	-R 10.00	
	Fuel costs				-R 300.00	-R 10.00	
	Insurance and license costs				-R 300.00	-R 10.00	
	Interest costs				-R 300.00	-R 10.00	
	Maintenance and repair costs				-R 300.00	-R 10.00	
k)	TOTAL PRE-HARVEST COSTS (e+i)				-R 13 875.00	-R 462.50	
l)	TOTAL HARVEST COSTS (f+j)				-R 10 387.50	-R 346.25	
m)	GROSS MARGIN/(LOSS) ABOVE TOTAL ALLOCATABLE VARIABLE COSTS (c-k-l)				R 17 737.50	R 591.25	
n)	Interest on working capital	R 236.00			-R 236.00	-R 7.87	
o)	Financing/rental costs	R 750	ha	1	-R 750.00	-R 25.00	
p)	Regular labour costs (salaries)	R 7 500	ha	2	-R 15 000.00	-R 500.00	
q)	Irrigation labour costs	R 300.00	ha	1	-R 300.00	-R 10.00	
						R 0.00	
r)	MARGIN/(LOSS) ABOVE SPECIFIED COSTS (for season)				R 1 451.50	R 48.38	

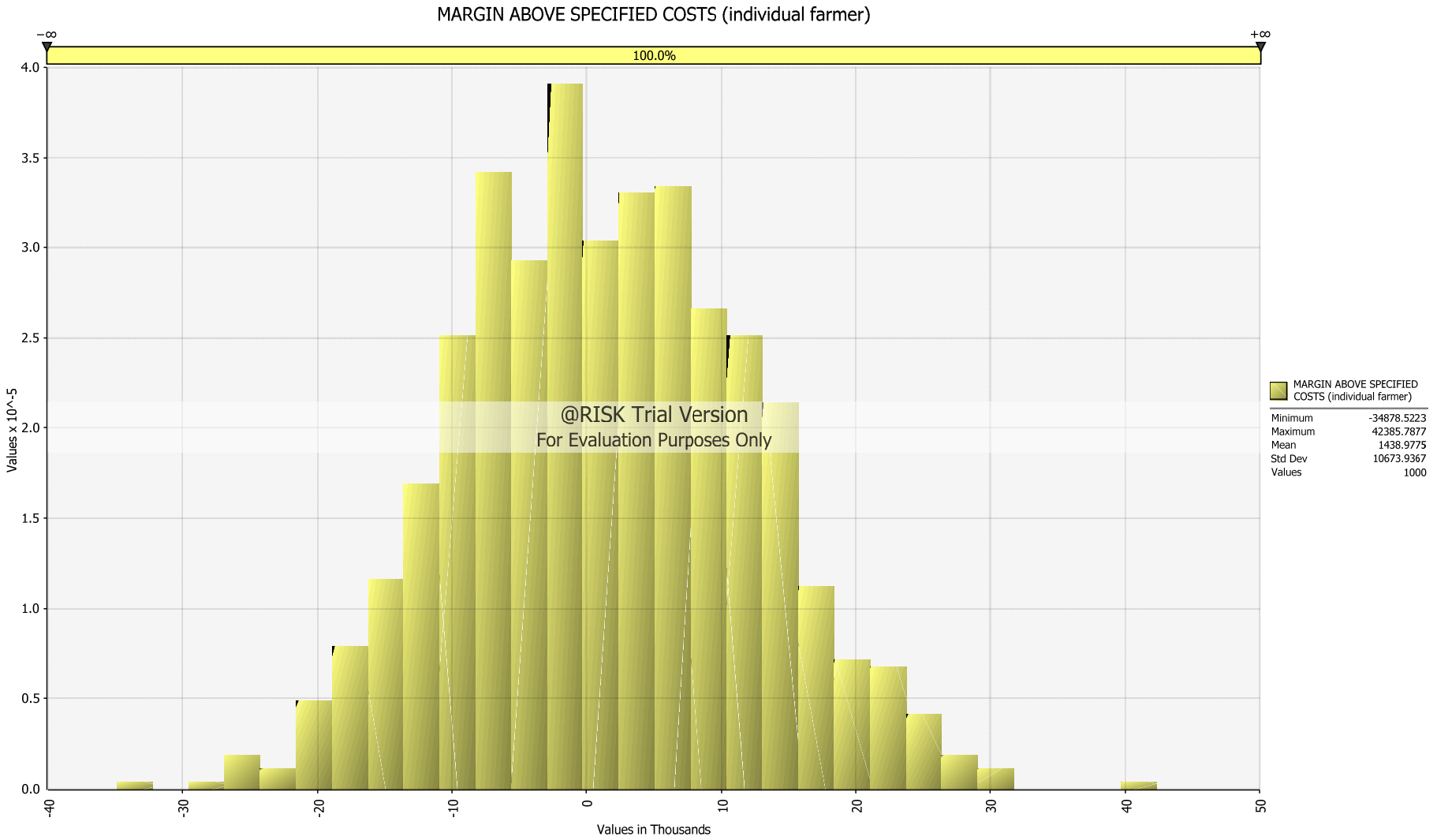


Figure 6.3 Distribution function of simulated gross margin per hectare outcomes of small-scale lettuce farmer

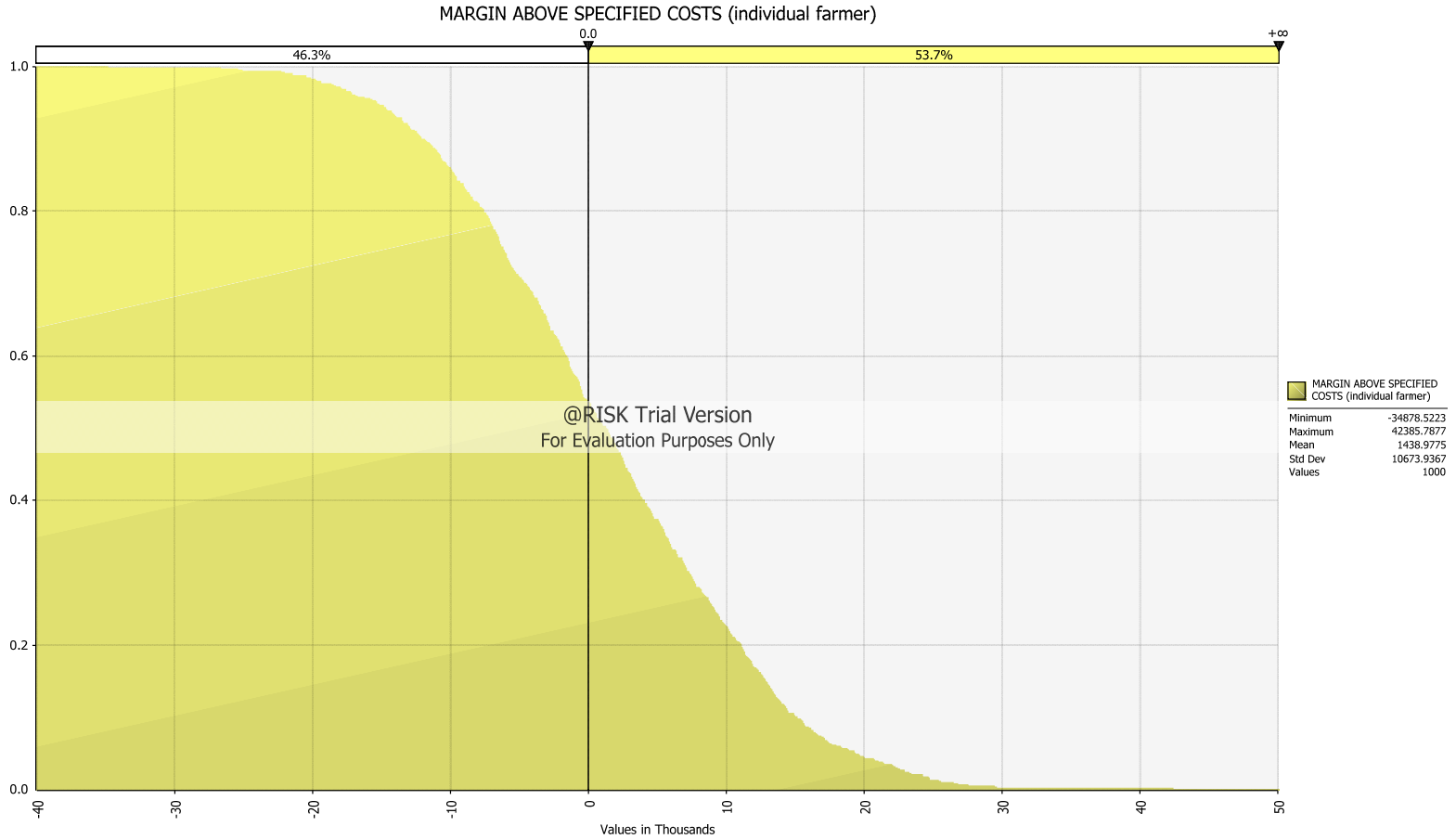


Figure 6.4 Cumulative descending probability density function of simulated gross margin per hectare outcomes of small-scale lettuce farmer

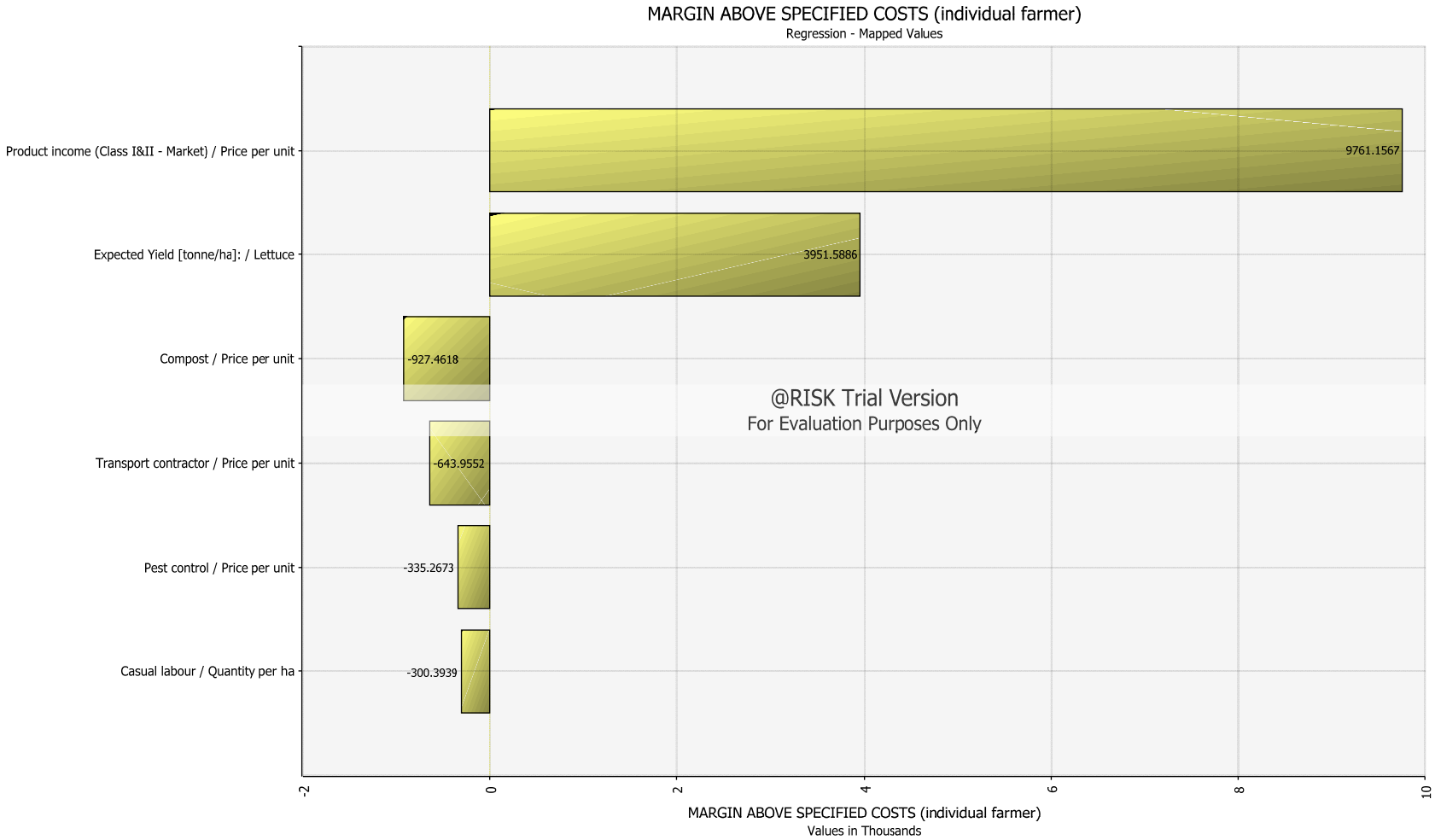


Figure 6.5 Regression chart of the sensitivity analysis of the gross margin per hectare outcomes of the small-scale lettuce farmer

From the graphs above it can be concluded that the probability of the small lettuce farmer making a profit, based on the input scenarios provided, is 53,7% (the area on the right hand side of the delimiter on '0' in Figure 6.4, calculated by Excel through the integration of the probability density function between the values of '0' and ∞).

The most sensitive items that could be identified from Figure 6.5 are the product income and the yield of the product, followed by the costs of compost as input and the transport contractor. The improvement of the yield and incomes per tonne of final product, as well as the cost of compost and transport, should therefore be a focus point in the farmer's strategy since the other input costs' effect on the gross margin is minimal in comparison to the impact of the selling price.

6.3.2 The value chain analysis

During the work session that was held, the value chain of the group of small farmers was investigated, which included the identification of infrastructure, role players, markets and linkages that were available. The farmers described their existing value chain and processes in the chain as the following actions:

i) With regards to ordering and collecting seeds and seedlings for planting, farmers deal with nurseries and seed suppliers individually. Seed suppliers normally provide the farmer with a generic planting programme, consisting of information regarding which actions should be taken at what time. No after sales services are provided by the suppliers due to the small volumes bought by the farmers;

ii) Farmers procure materials, implements and inputs from the local farmer's co-operative retail store on an individual basis as and when required;

iii) Farmers prepare land (clear fields, plough land, apply compost, etc), erect and install infrastructure (fencing, pipes and irrigation equipment, trellises, etc) and plant seeds or seedlings on their own, with the assistance of family, and in some cases hired labour;

iv) Farmers attend to their land by irrigating fields (where applicable), applying fertiliser, weeding, etc;

v) Farmers harvest crops as they become mature, and pack them in harvest bins, boxes or crates. No special attention is given towards removing the field heat from the harvested produce, but farmers do endeavour to harvest early in the morning;

vi) Harvested produce is washed and packed into boxes or bags by hand;

vii) Packed produce is transported to potential customers or the Market by the farmer (if transport is available) or by a third party contractor;

viii) Four types of markets exist for the harvested produce:

- The farmer uses the produce for own consumption;
- The farmer gives the produce to school feeding programmes or hospitals and clinics (normally there is a very low or even no return for this, and it is mostly done out of charity and as a service to the community);
- During the early morning informal traders visit small farmers to procure produce to sell for the day;
- The farmer can take the produce to an agent at the Cape Town Market, and the agent tries to sell the produce on the farmer's behalf – if the produce gets sold, the agent and the Market gets a commission of the final selling price, and the farmer receives the rest. Generally, agents are obliged to accept any farmer's produce, and must try to sell it;

ix) Informal traders and other buyers visit the Market to buy[22] produce;

x) Unsold produce that is past its sell-by-date, or which is beginning to rot, is dumped at the expense of the farmer – in some cases NGO's sort out some of the unsold produce that is still edible for the purpose of charity organisations;

xi) A commission of 12,5% (7,5% for the agent and 5% for the market) is subtracted from the final selling price. The rest of the money is normally paid to the farmer within seven days.

The value chain, as summarised above, is illustrated in figure 6.2.

[22] The system of purchasing or "auctioning" of produce at the Markets are beyond the scope of this report and not important in the context of this study, and it will thus only be referred to as produce that is "sold"

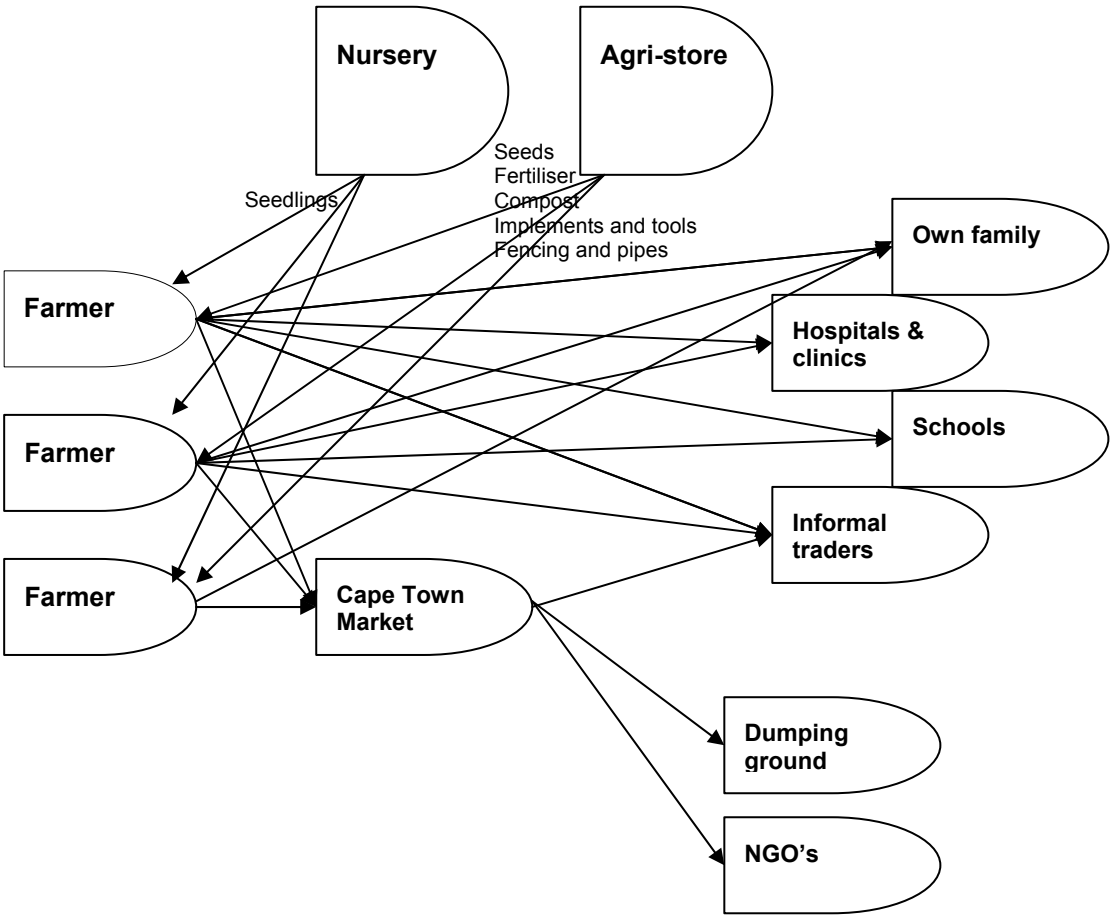


Figure 6.6 Conceptual representation of the Cape Metropole small farmers' value chain

(Source: data from work session with small farmers in Philippi, Cape Metropole, June 2008)

After the existing value chain was drawn up, the critical points and potential key success factors were identified with the help of the models described in this study. Through analysing the sector using Porter's diamond of competitiveness and the table of major determinants in South African agriculture (Table 3.1), opportunities for improved competitiveness of these farmers were identified through the investigation of the status quos of these determinants. The observations regarding the major determinants of competitiveness are summarised in the tables below – each table is accompanied with a short description on the proposed strategies to address the items that were identified as key success factors with the highest potential.

6.2.1.1 Factor conditions

Production factors	Observations
Cost of production Cost, quality and availability of labour; Administration costs associated with labour	• Since the area lies within an urban area, labour is abundant, but the cost of labour is high because of the proximity to the City where higher wages are applicable than in rural areas. Trained labour, however, could be difficult to obtain • The farmers of this area often make use of family assistance in farming, and many farms are small enough to be served by the manager and one or two workers
Natural resources Quality and availability	• The area has mostly sandy soils, which are suitable for the production of most vegetables • Arable land is getting scarcer because of residential growth and developments in the area • Underground water is generally available and can be extracted via boreholes • Soils and water quality are degrading because of pollution
Location	• Farmers are ideally located in terms of road access, market infrastructure (the Philippi Market) and a big buying market (the Cape Flats and the bigger metropolitan area – this strength is not sufficiently exploited
Capital Cost and availability	• Three major sources of "low cost" capital exist – a *Landback* loan of up to R100 000 at 8% interest p.a. [a business plan is required] or public capital from the local authority (the City of Cape Town) or the Department of Agriculture [in both cases the application process ranges from 6 to 18 months]
Knowledge Cost , quality and availability	• Farmer's knowledge on market demands and modern farming techniques are low • Production training facilities are available to the farmers (at least three within a 5 km radius) • Assistance is available in the form of Department of Agriculture extension officers
Infrastructure and technology Cost , quality and availability	• Modern marketing and processing facilities are available in close proximity to the farmers, at the Philippi Market. The facility is rented our to agri-businesses ranging from R8/m² (for storage and trading stalls) to R18/m² for processing and cold storage facilities • Many of the infrastructural items required by farmers are obtainable via an application for grant funding

The Philippi Market is an infrastructure that was developed mainly for the benefit of small farmers in the Western Cape. However, this facility is not utilised by these farmers, since they are not able to justify the costs of renting the facility on an individual basis. A space for storage, packing and processing of fresh produce exists at the Market, which could be utilised to improve the quality and marketability of their produce. The fact that the farmers are located in close proximity to the Philippi Market, with the infrastructure that is required for the post-harvest handling and storage of fresh produce, should be better utilised, even if farmers have to make a joint effort to utilise the equipment in such a manner that the cost of renting the facility is justified.

Improved knowledge regarding production methods and the handling of produce can improve the quality and quantity, and thus the return to these farmers – Government provides agricultural extension services to farmers, but further information could be provided. A training and demonstration unit (possibly by the means of public funding allocated towards the empowerment of emerging farmers) could be established at the Philippi Market.

A further strategy that could be implemented, once a formal market has been identified, is to provide training and production manuals and quality criteria booklets or pamphlets to farmers, based on information from specialist partners and the criteria of the market. Specifications that are easy to understand, and photographs of different classifications, based on quality and sizes, should empower farmers to differentiate between higher and lower quality produce, which could motivate them towards improvement.

Market information is important for all stakeholders – as technology improves, competitiveness in the agri-food sector is becoming less dependent on basic factors such as resources and location advantages (although they still have a role to play), and more dependent upon up-to-date market information. Knowledge of the latest technology and practices in value addition, quality and traceability criteria and logistics are becoming more and more important (Ruben et al. 2006). The provision of up-to-date market information to farmers by means of cell phone communication could provide them with valuable data regarding prices, volumes, demands, orders and more.

The high costs of hired labour, the scarcity of trained labour, and the high costs involved in managing labour suggest that farmers should keep their production areas at the relatively small sizes which they already are, while co-operating with other farmers in order to increase their economies of scale.

Since capital is available in the forms of soft loans and grants, it is proposed that a business plan for funding applications is compiled, detailing the proposed collective action to be taken by these farmers. The plan should contain all the information that was investigated and proposed through the identification, analysis and development stages of the Framework. Special attention should be given to the resources that they currently have at their disposal, potential markets that are available to them, the risks involved in entering a business venture like this, and estimations on the potential returns, which could be based on the PCAS simulations.

6.2.1.2 Demand conditions

Demand conditions	Observations
Market size	• High demands exist for fresh food in the Cape Metropole due to urbanisation
Market information Quality, availability and cost	• Resource poor farmers generally do not have access to the internet, therefore obtaining up-to-date market information is a challenge. Market information can be obtained from the Market by phone – the quantity, quality and accuracy of information is therefore low (information gained through "word of mouth" or telephone conversation) and expensive • Resource poor farmers are not informed of the demands and criteria required by supermarkets and higher class customers
Quality of products	• Two distinct market segments exist – low volume, high quality (niche markets for middle/upper class customers) and high volume, standard quality (informal and lower class market)
Market growth	• Demands are growing due to urbanisation of rural populations • Consumers are gaining knowledge on the value of fresh produce and food safety, resulting in increased demands • The growth in the middle class economy increases the demand for higher quality produce and convenience (pre-cut, value added) produce

Three marketing opportunities for small farmers to be linked to formal markets were identified based on demand conditions in their surrounding areas:

- A demand for good quality, low cost, high volume produce (specifically cabbages, spinach, carrots and butternuts) was identified during a meeting with the Khayelitsha Spar near the Philippi Market. The Store Manager is willing to enter into take-off agreements for the supply of these products by the small farmers of the surrounding area. The conditions for such an agreement include the requirement that produce be supplied to the store twice a week, and that the store deals with one responsible person, who collects and delivers the products from the farmers based on the store's orders and according to the store's quality criteria;
- The processing facility at the Philippi Market requires fresh produce on a daily basis, which is currently sourced from Cape Town market. The processing facility is willing to enter into take-off agreements with the farmers of the area,

provided the farmers endeavour to comply to Good Agricultural Practices, which is required by the processor's clients;

- On a study launched by the Philippi Market, more than 160 informal traders were identified, all of whom sell more than 1 000 tonnes of fresh produce per month from the pavements surrounding the Philippi Market. These traders have indicated their willingness to support their "own" producers (farmers on the Cape Flats), as opposed to buying products from commercial farmers at the Cape Town Market.

The three abovementioned markets could be pursued within a short period of time, since the produce required by these markets is already being produced by the small farmers. Since the demand for fresh produce in the surrounding areas is high, it is anticipated that more markets could be identified once a group of organised farmers – with access to facilities, the correct planting material and other inputs – is established.

6.2.1.3 Related and supporting industries

Related and supporting industries	Observations
Financial institutions	• Farmers have access to low cost financing through the *Landbank* • Farmers have access to grants for infrastructure
Research institutions	• Research on appropriated technologies and improved varieties in the Philippi horticultural area is done by the Public sector (Department of Agriculture) and by non-profit organisations
Transport	• Many farmers do not have their own transport • Informal transport enterprises are available, but at a high cost
Suppliers of packaging material	• Suppliers of packaging material are located in Cape Town
Electricity supplies	• Since the area lies in an urban area, the farmers are well served with electricity and other bulk services
Agricultural suppliers	• Almost all of the farmers source their agricultural input products from the agri-cooperative store in Philippi, which stocks a range of products at retail prices • An established and competitive nursery, Landorff nursery, that supplies seedlings in bulk to major producers, is located in Philippi • An established seed and agricultural input supplier to major producers, Hygrotech, has a regional office in Stellenbosch, 25 km from the Philippi Market • A relatively large, though informal, compost manufacturing firm is located in the Philippi area
Competitiveness, sustainability and linkages	• The major input suppliers have been established and are competitive with regards to pricing as long as products are sourced in bulk • There are currently no formal linkages between input suppliers and the farmers of the area
Related industries	• A number of agricultural training facilities exist in the area (Orient farm, Delft Farmers Association, Abalimi Bezikhaya and others) • Informal stock and poultry farmers in the area could provide manure for in-house compost manufacturing

The supporting industries in the area could improve the competitiveness of small farmers by providing them with products and services that are either of a higher quality, more appropriate, or available at a lower costs than what is currently the case. A number of opportunities for linking supporting industries with small farmers were identified, including:

- One of the constraints small farmers in Cape Town have to face includes the sourcing of the correct seedlings at competitive prices. The largest nursery in the area, Landorff nursery, has seized to supply small farmers with seedlings due to the nuisance of having to deal in small quantities – a development which has increased the difficulty of farmers to source seedlings. However, upon enquiry, Landorff nursery agreed to supply seedlings on an order basis to a group of farmers through the Philippi Market, subject to large enough volumes being ordered;
- For further improvements in terms of the competitive supplies of inputs, Hygrotech, a large seed and agricultural input supplier, agreed to provide inputs to small farmers belonging to a group connected to the Philippi Market, at a discounted rate as part of their social responsibility;
- One of the traders at the Philippi Market has a small delivery vehicle that he uses to collect fresh produce from the Cape Town Market and other commercial farmers in the surrounding area. The trader is willing to provide transport at cost for the collection and transport of fresh produce and inputs for small farmers that are connected to (and supply) the Philippi Market;
- Although a composting supplier already exists in the area, the in-house manufacturing of organic compost could improve the availability, and reduce the cost of compost as input material. Organic waste products (fresh produce not suitable for human consumption, grass clippings and other garden refuse) as well as animal manure – which could be sourced from the stock and chicken farmers in the area – would be required to produce soil-conditioning compost. Agri-Expert, an agricultural consulting firm, agreed to initiate a small-scale composting manufacturing unit at the Philippi Market in order to transform lower quality and organic waste products into compost, which could then be used by small farmers to improve the condition of their soils.

The willingness of the private enterprises listed above suggests that private specialists are prepared to support small farmer initiatives if they are organised or grouped to increase volumes and to ensure easier distribution to one central facility.

6.2.1.4 Firm strategy, structure, and rivalry

Firm strategy	Observations
Adaptability	• The farmers of the area have a low ability to adapt to market trends, even though their small size should give them an edge over bigger firms – the lack of market knowledge and access to market information is a constraint in this regard
Culture	• Agriculture is part of the lifestyle of the farmers in the study area • During the workshop held with the farmers, camaraderie was picked up from the group, but it could not be established whether the farmers would trust each other if they were to be clustered to co-operate towards supplying a specific market
Structure	• The structure of many of the small farmers' businesses are in the form of owner-manager or family businesses
Flexibility	• The small scale of operations, the small number of employees and the low level of technologies mean that the farming operations are flexible in terms of changing their strategy or modus operandi's
Pricing structure	• Currently, the pricing of the farmers' products are dependent on the traditional price forming mechanism, the average prices on the National Fresh Produce Market
Managerial capabilities	• Since farms are small and labourers are few, the managerial capabilities and experience of these farmers do not need to be high
Market power of suppliers	• The larger agricultural suppliers in the area are competitive, which is one of the reasons why they have grown to their current stature
Market power of buyers	• The supermarkets in the area cater for the lower income groups of the Cape Flats, and generally trade in a high volume of low value products • The processor at Philippi Market supplies the upper end of the market
Threat of substitutes	• Should the small farmers be unable to supply the products as negotiated with a buyer, the threat for the farmer is the breaching of the contract, thereby diminishing the possibility of penetrating this market again, since the buyer would revert to sourcing produce from larger, more reliable, suppliers • Due to the current volatility of supply from small farmers, large buyers would request some sort of guarantee to have a surety of supply. This could be done by having an established commercial farmer as supply partner and mentor (at least for the first season or two) to provide security and piece of mind
Threat of new entrants	• No threat of new entrants to the sector are anticipated at this stage, since the major competition would be commercial farmers already in production

Collective action could be a means of improving the competitiveness of small-scale and resource poor farmers, as concluded earlier in this study. Agricultural co-operatives were found to be particularly valuable vehicles for growth and reduced risks for farmers, having addressed most of the constraints small farmers faced in the past. Furthermore, in most of the case studies it was found that a suitable project manager or co-ordinator was driving the process of grouping farmers, identifying markets and acting as the co-ordinator between suppliers, farmers and markets, thereby allowing farmers to focus (specialise) on farming.

The following firm structure is therefore proposed:

- A collective action initiative (such as an agricultural co-operative) is formed amongst the farmers, with the Philippi Market and its existing facility and linkages acting as a hub for the farmers. It should aim to include enough farmers with arable land to ensure that the group has the ability to supply formal markets on a continuous basis during the season, and to ensure that a critical mass of produce is reached, thereby justifying value adding facilities and transport costs;
- The integration of small farmers into established supply chains, with strict quality criteria and timelines, requires a new institutional and organisational network that will guide and assist these farmers in meeting these requirements (Ruben, Slingerland & Nijhoff 2006). A suitable project co-ordinator – to drive the process of collective action, growth and creation of networks and linkages – should be selected or appointed by the farmers. The project co-ordinator should co-ordinate and monitor planting programmes, the harvesting and supply of fresh produce to ensure that sufficient (but not excessive) quantities of produce are delivered to the market every day in order to fulfil the demand. The project co-ordinator will also be the channel of communication between farmers and buyers, since the supermarkets and other buyers would ideally like to deal with one responsible party only, in order to handle as few accounts as possible;
- The farmers should establish linkages with specialist supporting industries to improve quality and lower costs of inputs and services to the group;

- The management of the initiative should be transparent to all members in order to promote trust among them;
- A set of criteria for new members should be drawn up by the founding members to ensure that the new additions are capable and committed. It is proposed that prospective members should go through a training programme to demonstrate commitment;
- Although the firms will be co-operating with one another, some kind of incentive should still exist for farmers to improve performance, for instance shareholding, dividends and bonuses (rivalry);
- The threat of substitute suppliers, in the form of commercial farmers, could be addressed and turned into a key success factor by negotiating a partnership with an established commercial farmer. This would improve the economies of scale, reduce the risk for both the small farmers and the buyer, and would create the opportunity for a focused mentorship and knowledge transfer programme. Agricultural empowerment projects in Namibia are done on the basis of a commercial farmer partnering with small farmers, with the incentive to the commercial farmer being a project co-ordination fee, as well as access to grant capital for infrastructure, to be shared within the new farming entity.

Since high capital investments are required to access formal markets, the strategy of the group of farmers should be clear. A strategy to enter global markets from the first season is not a feasible or sustainable one. A more appropriate strategy would be to optimise the absorption of the entire spectrum of produce of the group – even waste products should be absorbed by, for instance, a composting manufacturer to ensure maximum financial return and growth. Inexperienced farmers could require a few seasons to create the infrastructure, implement food safety programmes, and to develop and learn the techniques required to improve quality of production. During this time a financial return would be required in order to sustain the farmer and the venture.

6.2.1.5 The role of Government

Government support	Observations
Indirect support	• Indirect support to the success of the farmers that are part of this study is provided through Government's endeavour to support and promote small businesses, participation from previously disadvantaged individuals in formal markets, and the target to reform the agricultural sector. Government grants and subsidies are thus available for these sectors
Trade policy	• More and more pressure is placed on businesses to procure from previously disadvantaged firms due to BEE policies, which increases the demand for products from these sectors, which in turn creates a competitive advantage for the farmers in the focus area
Land reform policy	• This item does not have any significant effect on the farmers that are part of this study
Labour policy	• This item does not have any significant effect on the farmers that are part of this study
Fiscal policy	• This item does not have any significant effect on the farmers that are part of this study

One of the most important factors that could create a competitive advantage for the farmers that are part of the focus area, is Government's aim to transform the agricultural sector in South Africa and to empower small-scale resource poor farmers to develop into commercial farmers. The infrastructure and facilities that are critical for improving competitiveness and access to markets should therefore be within a "sound and realistic application's" reach of these farmers (the establishment of the Philippi Market for emerging farmers was made possible due to public funding from Government).

Ideally, however, Government should not be in control of operating or managing any programmes. In Gandhi, Kumar & Marsh's (2001) case study of the Himchal Pradesh Fruit Processing and Marketing Corporation (HPMC), all the required infrastructure within the value chain (for improving the competitiveness of small farmers) was provided by public funding, including warehouses, collection depots,

processing equipment and cold storage. All of the infrastructure was provided, owned and operated by Government staff. The system worked well, but its biggest asset also became its biggest liability – the operation (by Government officials) was not ideal due to government bureaucracy, their lack of business skills and lack of enthusiasm towards the project. The results from this case study correlate with the situation for similar South African projects, where government officials usually do not have the experience or time to run such projects. It is therefore proposed for the facilities to be operated by dynamic personnel from the private sector – preferably somebody selected or identified by the farmers themselves, although the facilities could be Government-owned.

6.2.1.6 The role of chance

Chance	Observations
Economic stability	• The cost of fertiliser is directly linked to the oil price, and the whole agricultural industry is thus affected during time of instability and fluctuations • The viability of exporting and importing food products are also linked to the economic stability and economic situation of the country
Aids	• The effect of AIDS is a widespread concern in South Africa, especially the uncertainty it creates regarding the availability of labour – trained and experienced labour costs time and money to create. However, nothing can be done to reduce the impact of this determinant on the focus area, other than education regarding AIDS
Political stability	• Instability in the political sector could create uncertainty in the future growth potential of the country and the agricultural sector, which would decrease investments and development in the agricultural sector.
Price stability	• Prices on Cape Town Market fluctuate based on supply and demand, but prices from formal buyers are more stable due to planning and scheduling of supply to meet demands
Crime	• Due to high unemployment rates, crime is prevalent in the focus area, and infrastructure and produce are stolen or damaged from time to time

The determinant of chance is dependent on exterior factors, which are normally outside the control of farmers, let alone small farmers. However, the role of chance does have an impact on the competitiveness of the agricultural sector, and

specific consequences for the study area have been identified in the table above. Since these items are based on chance, rather than factors that are within control of the farmers, their potential impact is not regarded as providing any tangible opportunities for improved competitiveness for the farmers that are part of this study.

6.4 Stage three: Development

6.4.1 Proposed improved value chain

The key success factors and opportunities that were discussed in this chapter are illustrated in the proposed value chain of the small farmers in Figure 6.7 below. The value chain illustration can be seen as a summary of the draft strategy for the improved competitiveness of farmers in the focus area, and includes an indication of the main role players, linkages and markets in the focus area.

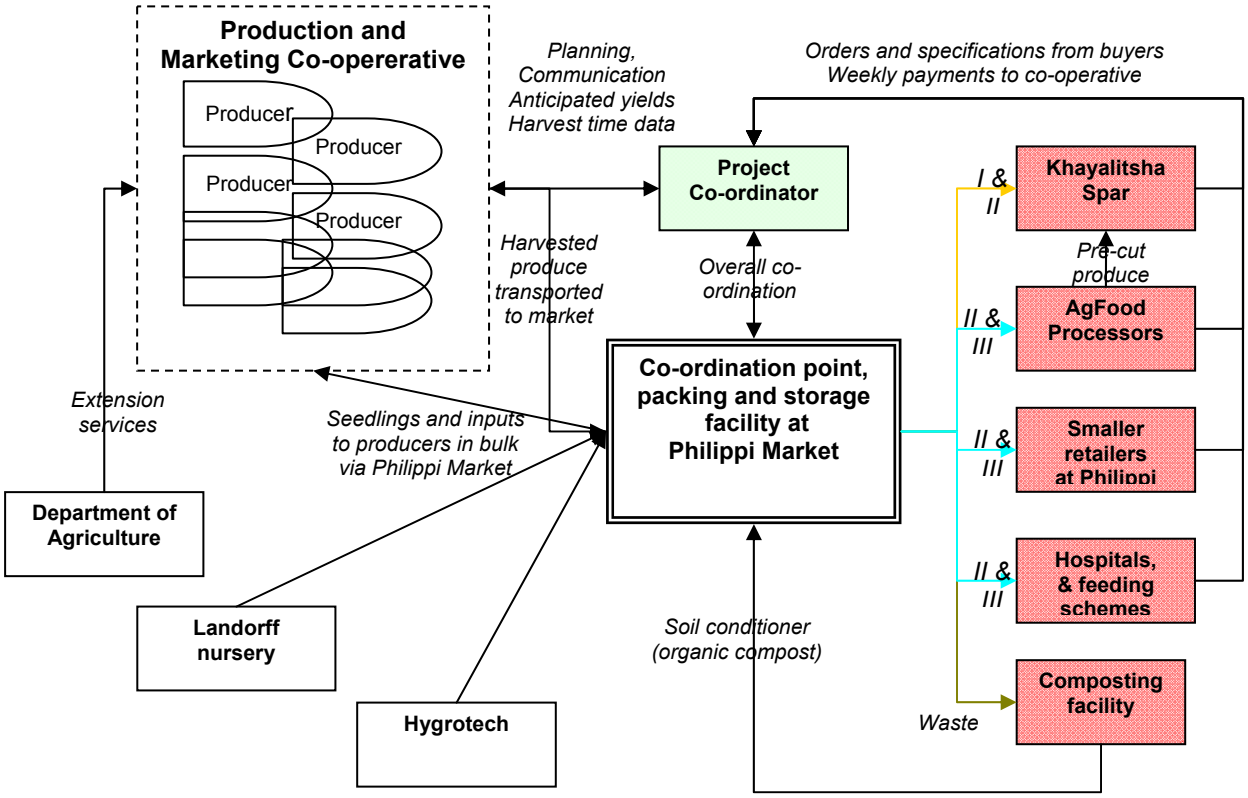


Figure 6.7 Broad overview of proposed value chain for small farmers in the implementation case study area

The anticipated results regarding the improved competitiveness of the farmers in the focus area are determined with the assistance of the PCAS in the next section.

6.4.2 The calculation and comparison of competitiveness

To measure the potential improvement of competitiveness due to the actions and changes in the value chain that is proposed in the draft strategy, an estimation should be made regarding the impact that the changes would have on the farmers' variable costs. The anticipated changes in the components that contribute towards the calculation of the gross margin, and therefore the competitiveness of the proposed cluster of farmers versus those of an individual farmer, include the following:

- A wider variety of produce could be supplied – it is anticipated that lettuce, cabbages, butternuts and spinach would be the starter commodities, because these crops are already produced by the farmers on an individual basis, and all four are commodities that are in high demand in the area;
- Higher returns with less fluctuations in selling prices could be achieved by negotiating supply agreements with formal markets such as supermarkets and processors. The average prices that could be achieved for Class I and II produce, were estimated based on the average selling prices of these commodities in the Khayelitsha Spar, less a profit margin of 25 to 30% (own assumption). Furthermore, it is anticipated that the prices will only fluctuate by about 15% either side of the mean value that was chosen;
- No marketing commission will be payable by the farmers since their produce will be marketed directly to private clients, but a membership fee will be applicable to cover the overheads of the co-ordination, management and marketing of the group. The total costs of overheads were estimated at R180 000 per month, which relates to a cost of about R400 000 per season of 2.5 months (average production season for the crops selected, from land preparation time until final harvest). Approximately 20 ha of land is available for production from the prospective members. The overhead costs thus relate to an average contribution of R20 000 per ha for the season;
- In order to improve upon the quality of produce (which was identified as one of the items that has a significant impact on the gross margin, and should therefore be

addressed), improved inputs and production assistance should be sourced. It would be worthwhile to spend more money on quality inputs that would provide increased probability of quality final products. The average price of the input costs could also decrease should the farmers negotiate the prices based on bulk sourcing. The CPCAS has been adjusted with regards to both these anticipated effects.

- All indirectly variable expenses have been included in the overhead costs;
- For the individual farmer, the irrigation of the crops was neglected or done by the farmer himself. A higher priority on irrigation – to improve the quality of the produce – is allowed for, and therefore the irrigation labour component is estimated at a significantly higher cost per ha than what it was in the individual farmer scenario. An allowance for water rights has also been included as an expense;
- In addition to the standard input costs being modelled as described above, it was also decided to model the hours required per ha per casual labourer as a normal distribution;
- In order to investigate the effect of the size of the co-operative, the members of the co-operative are modelled as a discrete function, as indicated in Figure 6.8, and the total number of hectares that are part of the co-operative is modelled as a Gaussian (normal distribution).

The calculation of the estimated improved competitiveness of the farmers in the implementation case study focus area, based on the information and assumptions provided to the model, is indicated in the CPCAS in Table 6.1 overleaf.

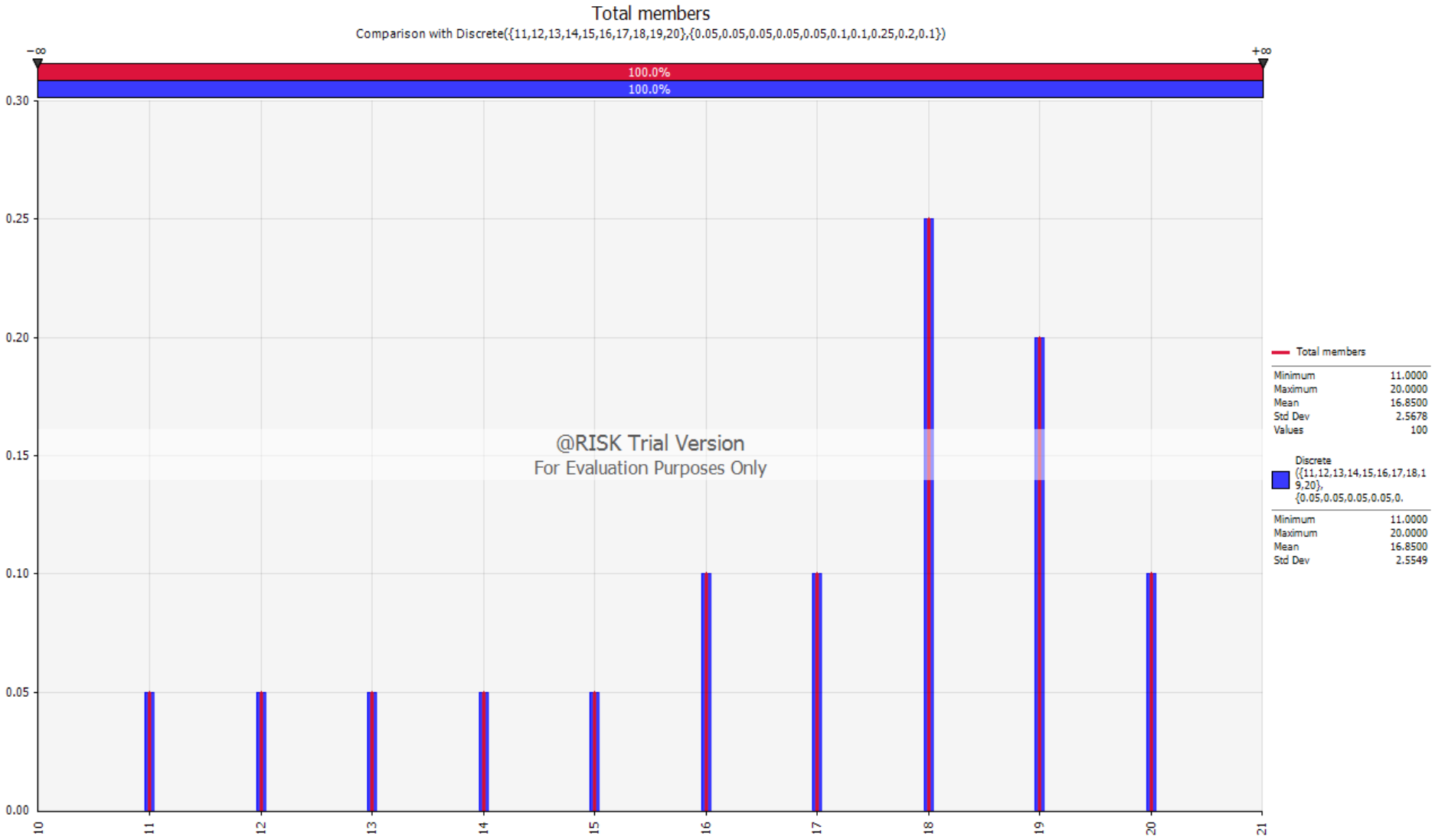


Figure 6.8 Discrete distribution of the number of members that are part of the proposed co-operative

Table 6.2 CPCAS for farmers in the implementation case study area

ASSUMPTIONS

Expected Packout:		
	Class I (% of total yield)	50%
	Class II (% of total yield)	30%
	Class III (% of total yield)	20%
Product:		Lettuce
Expected Yield [tonne/ha]:		30

ASSUMPTIONS

Total overheads per month	R 160 000	
Thus overheads per season (average 2.5 months)	R 400 000	
Total members	20	
Total membership hectares	20	ha
Average ha per member	1	ha

Expected Packout:		
	Class I (% of total yield)	60%
	Class II (% of total yield)	25%
	Class III (% of total yield)	15%
Product:	Lettuce, Cabbages, butternuts, spinach	
Average Expected Yield [tonne/ha]:		30

Individual small farmer scenario

	Price per unit	Unit	Quantity per ha	Return/(Cost) per ha per season	Value per yield unit
a) GROSS INCOME				**R 48 000.00**	**R 1 600.00**
Product income (Class I&II - Market)	R 2 000.00	/tonne	24.00	R 48 000.00	R 1 600.00
b) MARKETING COSTS				**-R 6 000.00**	**-R 200.00**
Market and agent commision (fixed)	12.5%		R 48 000.00	-R 6 000.00	-R 200.00
c) GROSS INCOME minus MARKETING COSTS (a-b)				**R 42 000.00**	**R 1 400.00**
d) ALLOCATABLE VARIABLE COSTS (e+f)				**-R 21 262.50**	**-R 708.75**
e) Pre-harvest cost				**-R 12 375.00**	**-R 412.50**
Compost	R 600.00	/m³	15	-R 9 000.00	-R 300.00
Planting material	R 1.50	/kg	250	-R 375.00	-R 12.50
Pest control	R 200.00	/litre	15	-R 3 000.00	-R 100.00
f) Harvest costs				**-R 8 887.50**	**-R 296.25**
Casual labour			350	-R 2 887.50	-R 96.25
	R 8.25	/hour			
Transport contractor	R 10.00	/km	600	-R 6 000.00	-R 200.00
g) GROSS MARGIN/(LOSS) ABOVE DIRECTLY ALLOCATABLE VARIABLE COSTS (c-d)				**R 20 737.50**	**R 691.25**
h) INDIRECTLY VARIABLE COSTS (i+j)				**-R 3 000.00**	**-R 100.00**
i) Pre-harvest cost (allow for)				**-R 1 500.00**	**-R 50.00**
Depreciation				-R 300.00	-R 10.00
Fuel costs				-R 300.00	-R 10.00
Insurance and license costs				-R 300.00	-R 10.00
Interest costs				-R 300.00	-R 10.00
Maintenance and repair costs				-R 300.00	-R 10.00
j) Harvest costs (allow for)				**-R 1 500.00**	**-R 50.00**
Depreciation				-R 300.00	-R 10.00
Fuel costs				-R 300.00	-R 10.00
Insurance and license costs				-R 300.00	-R 10.00
Interest costs				-R 300.00	-R 10.00
Maintenance and repair costs				-R 300.00	-R 10.00
k) TOTAL PRE-HARVEST COSTS (e+i)				**-R 13 875.00**	**-R 462.50**
l) TOTAL HARVEST COSTS (f+j)				**-R 10 387.50**	**-R 346.25**
m) GROSS MARGIN/(LOSS) ABOVE TOTAL ALLOCATABLE VARIABLE COSTS (c-k-l)				**R 17 737.50**	**R 591.25**
n) Interest on working capital	R 236.00			-R 236.00	-R 7.87
o) Financing/rental costs	R 750	ha	1	-R 750.00	-R 25.00
p) Regular labour costs (salaries)	R 7 500	ha	2	-R 15 000.00	-R 500.00
q) Irrigation labour costs	R 300.00	ha	1	-R 300.00	-R 10.00
					R 0.00
r) MARGIN/(LOSS) ABOVE SPECIFIED COSTS (for season)				**R 1 451.50**	**R 48.38**

Small farmer part of collective action scenario

	Price per unit	Unit	Quantity per ha	Return/(Cost) per ha per season	Value per tonne yield
aa) GROSS INCOME				**R 74 250.00**	**R 2 475.00**
Product income (Class I to supermarkets)	R 3 500.00	tonne	18.00	R 63 000.00	R 2 100.00
Product income (Class II to informal trade/wholesale)	R 1 500.00	tonne	7.50	R 11 250.00	R 375.00
bb) MEMBERSHIP FEES (overheads/total membership ha)				**-R 20 000.00**	**-R 666.67**
Total overheads/membership hectares	R 20 000.00	ha	1.00	-R 20 000.00	-R 666.67
cc) GROSS INCOME minus MEMBERSHIP FEES (aa-bb)				**R 54 250.00**	**R 1 808.33**
dd) ALLOCATABLE VARIABLE COSTS (ee+fff)				**-R 30 975.00**	**-R 1 032.50**
ee) Pre-harvest cost (based on bulk sourcing)				**-R 22 987.50**	**-R 766.25**
Compost	R 500.00	/m³	26	-R 13 000.00	-R 433.33
Fungis control	R 120.00	/litre	25	-R 3 000.00	-R 100.00
Pest control	R 220.00	/litre	25	-R 5 500.00	-R 183.33
Weed control	R 15.00	/litre	25	-R 375.00	-R 12.50
Planting material (average for range of products)	R 1.45	/kg	250	-R 362.50	-R 12.08
Water rights and entitlement (average)	R 750.00	/ha	1	-R 750.00	-R 25.00
ff) Harvest costs				**-R 7 987.50**	**-R 266.25**
Casual labour			350	-R 2 887.50	-R 96.25
	R 8.25	/hour			
Transport contractor	R 8.00	/km	637.5	-R 5 100.00	-R 170.00
gg) GROSS MARGIN/(LOSS) ABOVE DIRECTLY ALLOCATABLE VARIABLE COSTS (cc-dd)				**R 23 275.00**	**R 775.83**
hh) INDIRECTLY VARIABLE COSTS (ii+jj)				**R 0.00**	**R 0.00**
ii) Pre-harvest cost (contributions included in membership fees - part of overheads)				**R 0.00**	**R 0.00**
Depreciation					
Fuel costs					
Insurance and license costs					
Interest costs					
Maintenance and repair costs					
jj) Harvest costs (contributions included in membership fees - part of overheads)				**R 0.00**	**R 0.00**
Depreciation					
Fuel costs					
Insurance and license costs					
Interest costs					
Maintenance and repair costs					
kk) TOTAL PRE-HARVEST COSTS (ee+ii)				**-R 22 987.50**	**-R 766.25**
ll) TOTAL HARVEST COSTS (ff+jj)				**-R 7 987.50**	**-R 266.25**
mm) GROSS MARGIN/(LOSS) ABOVE TOTAL ALLOCATABLE VARIABLE COSTS (cc-kk-ll)				**R 23 275.00**	**R 775.83**
nn) Interest on working capital	R 236.00			-R 236.00	R 7.87
oo) Financing/rental costs	R 750	ha	1	-R 750.00	-R 25.00
pp) Regular labour costs (salaries)	R 7 500.00	ha	2	-R 15 000.00	-R 500.00
qq) Irrigation labour costs	R 1 350.00	ha	1	-R 1 350.00	-R 45.00
					R 0.00
rr) MARGIN/(LOSS) ABOVE SPECIFIED COSTS (for season)				**R 7 161.00**	**R 238.70**

For this case study it was decided to compare the gross margins achievable per hectare, as opposed to the gross margins per tonne of final product. This was due to the fact that this term was the one to which the farmers in the focus area were used to. However, the results could be presented in either way, since the gross margin per tonne is just the gross margin per hectare divided by the average yield per hectare.

The outcomes from the modelling of the above inputs are contained in the graphs of Figure 6.9 to Figure 6.11 below. An abbreviated discussion regarding the results follows the graphs.

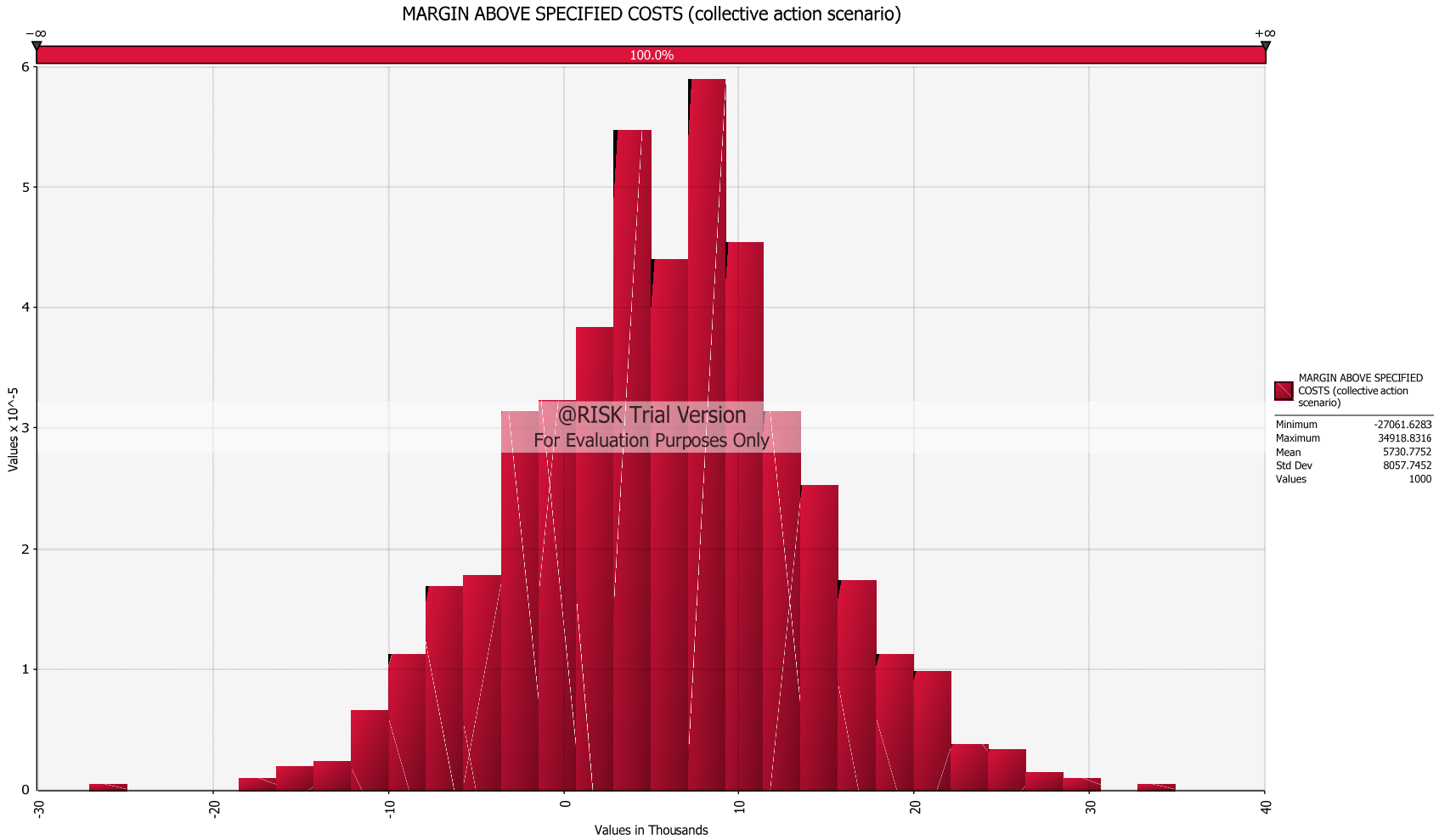


Figure 6.9 Distribution function of the expected gross margin per hectare outcomes of the collective action scenario

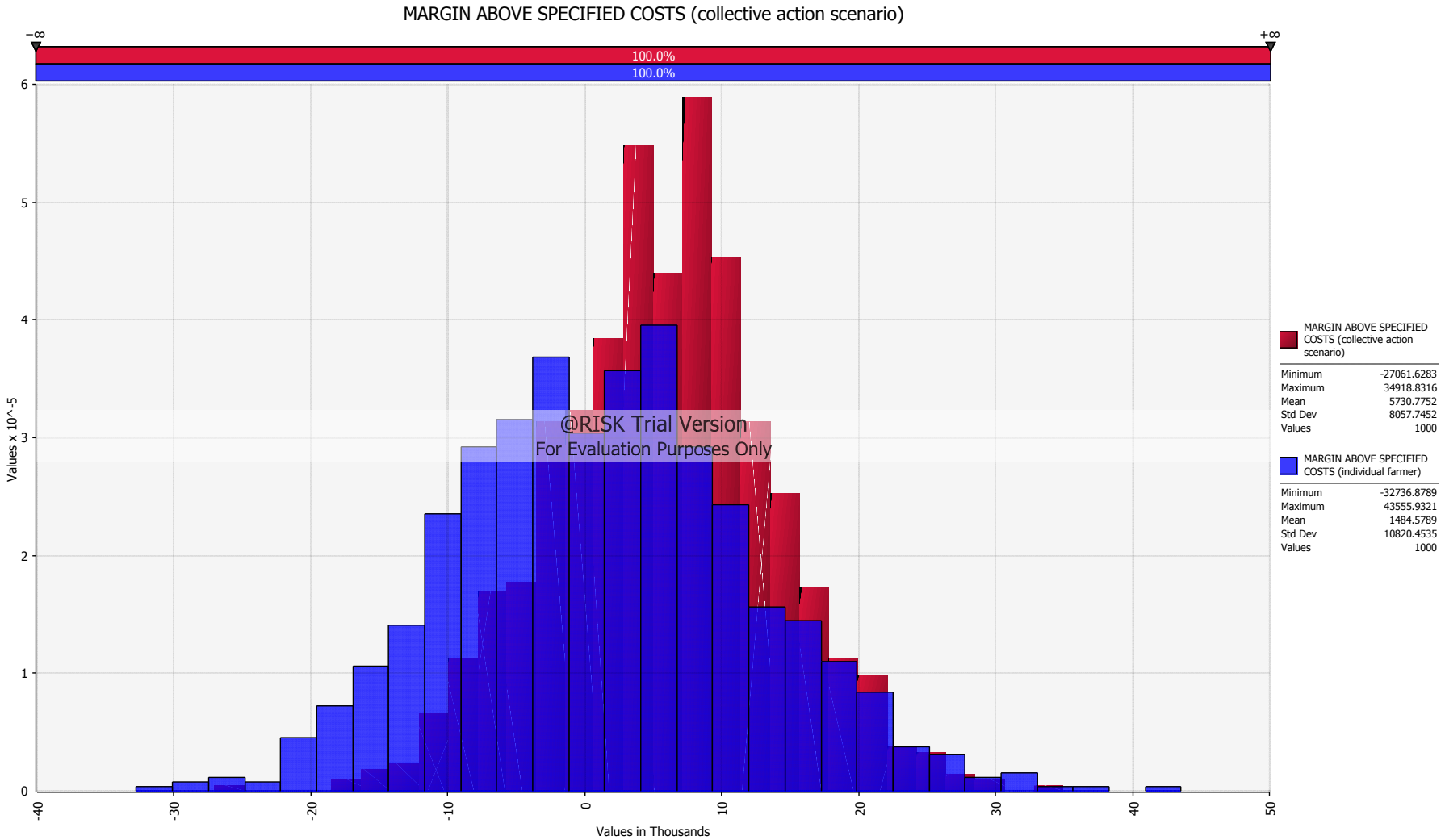


Figure 6.10 Overlaid comparison of distribution functions of the expected gross margin per hectare outcomes for the individual farmer scenario (dark/blue) and collective action scenario (light/red)

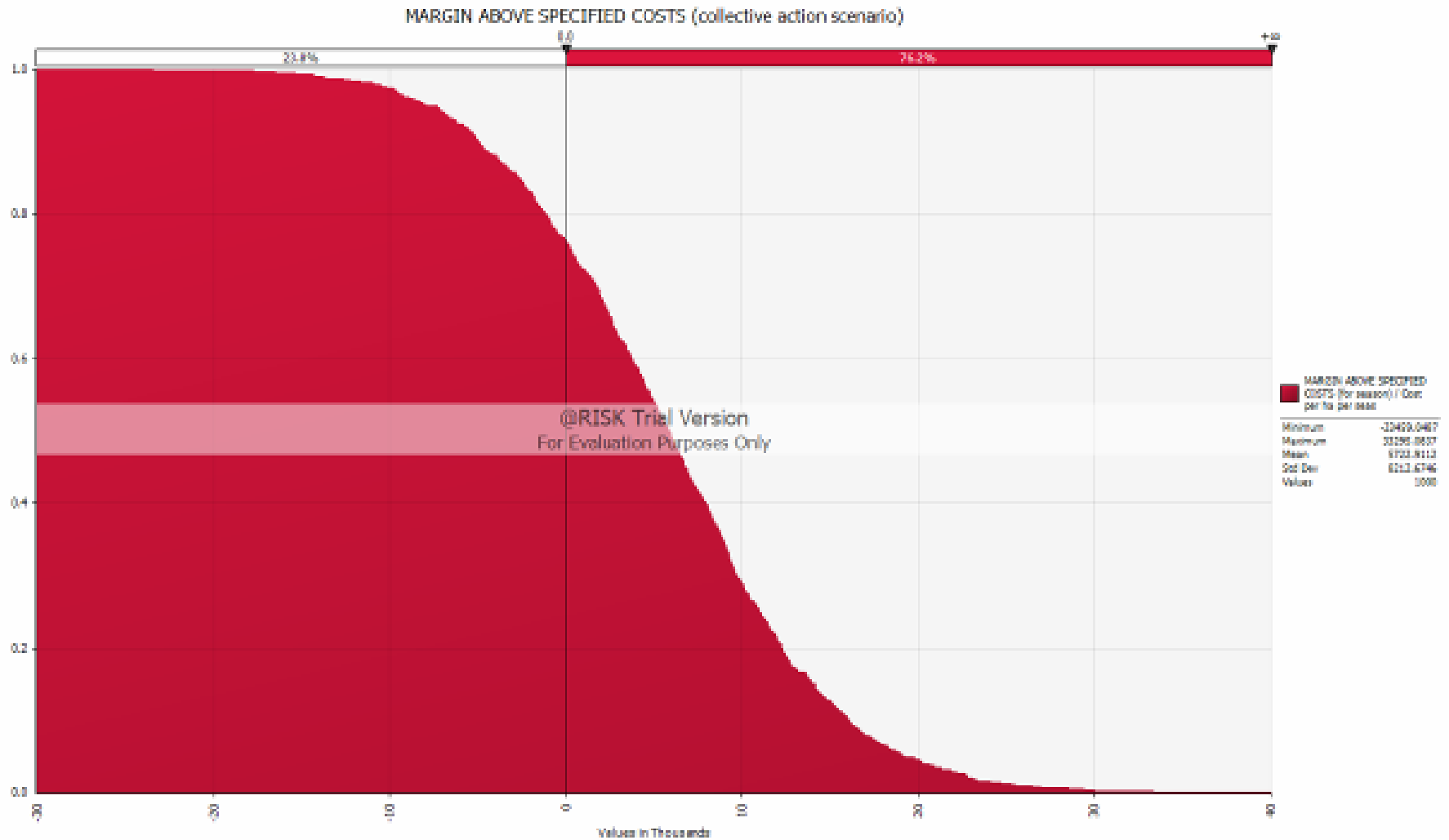


Figure 6.11 Cumulative descending probability density function of the expected gross margin per hectare outcomes for the collective action scenario, indicating the probability of a positive gross margin outcome

The potential improvement in competitiveness can be evaluated from the following results that can be read from the graphs above:

- The average expected outcomes of both the scenarios are illustrated in the graph of the comparison between the simulation of the two scenarios' outcomes in Figure 6.10 – the average simulated gross margin per hectare outcome for the collective action scenario is R5 730/ha, compared to the individual case average expected outcome of R1 483/ha;
- The probability of the collection of farmers in this scenario making a profit, is indicated as 76,2% in Figure 6.11, compared to the 53,2% of the individual farmer scenario illustrated in Figure 6.4.

The potential improvements are given in the form of probable outcomes, since the results and figures are based on assumptions that were made to simulate the outcome. The accuracy of the results should therefore only be regarded as an estimation, and of course this can only be as accurate as the assumptions that were made in the first place. For this case study the input values were relatively certain, since they were based on feedback from suppliers and potential buyers. As a result only a small window for the deviation of data was allowed for each respective input. The outcomes of the CPCAS simulation (i.e. the improvement of gross margin per hectare and an increase in probability for profit generation), can therefore be accepted as being sufficiently accurate, thereby confirming that the collective action strategy would improve the competitiveness of these farmers.

6.5 Stage four: Implementation

Unfortunately, the project which was used as a case study for testing and evaluating the Framework was halted, due to a lack of funding, before the implementation of the improved value chain could commence. However, the re-instatement of the project on a larger scale is in the pipeline, which will include a broader investigation for an overall strategy for improved competitiveness, with specific reference to linking farmers to markets through the Philippi Fresh Produce Market. To complete the evaluation of the Framework, one could thus only envisage the result or process that would have been followed during implementation. For the purpose of this study, an abbreviated discussion of the most important stages of the anticipated implementation programme is included in this section.

Based on the experience of the project and the feedback from the stakeholder, it can be envisaged that the implementation of the new value chain would have consisted of the following process:

- The identification and appointment of the project coordinator/project manager is an integral component of the proposed value chain. To gain the support and trust of the small farmers (one of the key success factors that was identified) it is proposed that a person from their community would be the most ideal candidate for this role. However, it should also be stressed that this person should have experience in project management and agriculture or the food industry;
- A sensitive and potentially intricate stage of the implementation process would be to gain and formalise the commitment by the farmers – the form of the commitment, and the penalties applicable in the event of misconduct or breach should be discussed in a workshop(s) with these farmers. The formation or establishment of a co-operating structure (co-operative or similar) should also be discussed and formalised during this stage;
- All the stakeholders that were identified gave their in principle support for the project. The next step would be to engage with these stakeholders, in conjunction with the leaders of the newly formed *co-operating structure*, and to formalise their requirements and commitment in order to plan the crops and varieties to be planted, the production and harvesting cycles and the logistics of delivering and collecting inputs and products to the farmers. The roles, requirements and responsibilities of all the stakeholders should be discussed as part of the formalisation of their commitment;
- Once the commitment, requirements and responsibilities of the farmers and the other stakeholders have been finalised, planning in terms of planting and harvesting programmes, as well as logistical plans, should get underway. The participation of the experienced stakeholders should be useful and practical during this stage, and would assist in identifying any requirements, responsibilities or potential risks that have been overlooked up until this stage. In addition, it is important that all stakeholders are made aware of the critical timing elements (for instance delivery time for produce to supermarkets) and the frequency of events (for instance weekly site visits by input suppliers) during this stage.

It is anticipated that at least three months should be allowed for the above implementation process. The timeframes however depends on the size of the project, the availability of the stakeholders for workshops, the amount of work that has been done in the past in terms of clustering or grouping farmers, and the complexity of forming a co-operating structure amongst the farmers.

6.6 Summary and conclusion

Although the Framework was not fully implemented at the time of writing this report, it is evident that the Framework, and its methodology to investigate the small farmer industry, contributed towards the identification of key success factors that could be focussed upon for bringing about improved competitiveness.

A positive response was received from the potential stakeholders of the project, as well as the private entities who were approached to be “linked” to the emerging farmers in order to improve the latter's competitiveness. Commitments with regards to future negotiations and co-operation in terms of the project were obtained from these entities. The future steps of this project would entail discussing the improved value chain, coupled with the proposed action to form a collective entity with the group of farmers – the objective being to gain their inputs and ownership of the strategy to be implemented.

CHAPTER SEVEN

CONCLUSIONS AND RECOMMENDATIONS

The aim of this study was to develop a framework to assist in the development of strategies for the improved competitiveness of small-scale, resource poor, horticultural farmers. To improve the situation of small farmers in the South African horticultural production and marketing environment, it was found that the "small-scale factor" constraint should be addressed, without taking away the advantages of "farmer-manager" or "family" style farming. In addition to this, "organised access" to formal markets and improved relationships with input suppliers would need to be created in order to address the farmer's lack of optimum inputs and services.

The Framework that was developed consists of components that could assist to identify and address the main constraints and requirements that small-scale, resource poor farmers face in the formal marketing system of South Africa. Through the investigation of literature on existing tools that have been used in the analysis and modelling of small-scale enterprises, *value chain analysis* and *collective action* theory have both been found to be useful in the context of the agricultural industry.

A literature study on value chain analysis as tool for the investigation of small farmers and the resource poor agricultural industry, has shown it to be both a suitable and proven mechanism, which has been used in this industry in developing countries for many years. Through such a value chain analysis of the South African horticultural industry, distinction was made between the difference in large-scale, commercial agriculture, as opposed to small-scale, resource poor agriculture. It was shown that smaller, emerging farmers do not have the resources to partake in all the activities required to market fresh produce to formal markets, which is why these farmers struggle to be competitive.

The literature study on collective efficiency as a strategy for small-scale agriculture resulted in a confirmation that the co-operation of small farmers is a key success factor for their improved competitiveness. It was found that the six determinants that influence competitiveness, as described in *Porter's Diamond of Competitiveness,* provide a logical and

thorough, step-by-step investigation process for analysing an industry with the aim of identifying key success factors for improved competitiveness.

From a case study analysis of previous successes of small farmer projects, a number of common key success factors for small farmer co-operation were identified. It was also found that agricultural co-operatives (or similar structures to promote collective action) are ideal vehicles to group farmers in order to promote growth, access to markets, and access to less expensive and higher quality inputs. They also assist in the endeavour to address the other constraints emerging farmer's face in South Africa, often related to the lack of economies of scale of individual farmers.

In order to measure "competitiveness" in the agricultural industry, the *production cost analysis* method was identified as being the most ideal from a number of tools available. A *Production Cost Analysis Sheet*, based on the COMBUD production costs guidelines of the Department of Agriculture, as well as the principles of the production cost analysis method, was developed in Excel to assist in the measurement of competitiveness, based on *gross margins per hectare* or *per tonne of final product*.

The Production Cost Analysis Sheet that was developed is also capable of estimating the probability of gross margin outcomes based on a number of variable inputs, which is useful for estimating the potential impact the implementation of a proposed strategy could have on a specific industry. The sensitivity analysis that can be generated through the modelling of the variable inputs and their effect on the outcome, is also valuable in the determination of key success factors that could be addressed for improved competitiveness within the industry.

The Framework that was developed through this study thus consists of proven theories and existing models, processes and mechanisms that have been applied in the agricultural industry or manufacturing industry before, as well as a modified version of a production cost planning guide to measure competitiveness in terms of production costs. The Framework provides a guideline for a logical investigation towards strategies for improved competitiveness. This includes the identification of role players, markets, opportunities and key success factors for improved competitiveness, as well as the Production Cost Analysis

Sheet to measure and model the competitiveness, the potential improved competitiveness and the probability of likely outcomes of variable inputs.

The results from the implementation case study that was done to evaluate the Framework, indicate that the Framework provides sufficient investigative tools to analyse an industry in terms of the factors that influence the competitiveness thereof. Although the draft strategy – developed through the data that was collected by using the steps in the Framework – could not be discussed with the stakeholders of the focus area for refinements or for implementation, the strategy that was developed is considered to be an improvement on the current competitiveness of the farmers of the focus area. Strategies for most of the constraints that were mentioned by the farmers in the focus area could be developed through the use of the Framework. In addition the Production Cost Analysis Sheet indicates significant potential for improvement in the competitiveness of the farmers, as well as increased probability of being profitable.

The one area of the Framework that has not been thoroughly tested (due to the fact that the strategy could not be implemented) is the accuracy of the modelling of the Production Cost Analysis Sheet. The Production Cost Analysis Sheet, in the form that it was used in this study, is still unsophisticated and in an early age of development. The sheet, in its current form, was used to indicate the concept of modelling variables according to statistical distributions to simulate their effect on the expected outcome. In this regard much more can still be done to make it more user friendly and intuitive. During this study, only the normal, gamma and the discrete distributions were used to model the potential impact of input variables on the gross margin outcome. More attention can still be given towards using more appropriate distributions that accurately represent the variability and the different scenarios of the various input costs.

Historical data and trends that were used in this study were based on research data, estimations and assumptions that were entered into the Excel sheet manually on every occasion. This could potentially be done with the assistance of a built-in database or library, coupled with a more user friendly manner in which to enter data.

It should be noted that, even if the Production Costs Analysis Sheet is further developed and refined, it would not always be able to provide an answer or indication on the improved competitiveness gained through the implementation of a strategy. Competitiveness in agriculture unfortunately still depends on human effort and human capital, and the commitment, willingness and eagerness of small farmers to develop and succeed, as well as a suitable and capable project co-ordinator to drive the process are key success factors that cannot be over-emphasised. These factors and their impact on the competitiveness or success of a farming entity cannot be measured as part of the Framework.

The Framework that was compiled and developed through investigations into *small firm competitiveness* literature and the *small farmer sub-sector*, is an attempt to provide a solution for the improved competitiveness and growth of the South African emerging farming sector. The purpose thereof should be seen as a guideline to be used in the analysis and development of strategies for specific resource poor farming industries. It is anticipated that the Framework could be further refined after a few implementations to identify and address further shortcomings. However, based on the successes from previous implementations of the individual components of the Framework, it can be anticipated that the Framework as a tool could assist in the process of improving the competitiveness and market access of small farmers in South Africa.

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ANNEXURE A

EXAMPLE OF SOUTH AFRICAN FRESH PRODUCE GRADING CRITERIA

AN EXTRACT FROM THE DIRECTORATE OF FOOD SAFETY AND QUALITY ASSURANCE

(complete document and more information obtainable from the National Department of Agriculture or at www.nda.agric.co.za)

TABEL 1/TABLE 1
GEHALTESTANDAARDE/
QUALITY STANDARDS

Gehaltefaktor/Quality factor	**Klas 1/Class 1**	**Klas 2/Class 2**
1	**2**	**3**
1. Voorkoms/Appearance	Gesond en aantreklik/ Sound and attractive	Soos vir Klas 1/As for Class 1
2. Vergroening, uitloopsels, misvormd, sandsplete, meganiese beskadiging, nerfaf, verbruining, gebreekte knolle, grondbesmeer, insekbeskadiging, aalwurm, rhizoctonia, skilaalwurm en vergrote lentiselle, bruinskurf, stingelentverotting en ander tipes droë verrotting, inwendige bruinvlek, aartappelmot, vaatbundelverbruining, uintjies en holhart/Greening, sprouts, malformed, growth cracks, mechanically damaged, abraded, browning, broken tubers, soiled, insect damage, eelworm, rhizoctonia, skin eelworm and enlarged lenticels, brown scab, stem-end rot and other types of dry-rot, internal brown fleck, tubermoth, vascular browning, watergrass and hollow heart	Soos in die kleurplate en instruksiehandleiding uiteengesit/As set out in the colour plates and manual of instructions	Soos in Klas 1/As for Class 1
3. Vreemde stowwe uitgesonderd chemiese residu's en grond/Foreign matter with the exeption of chemical residues and soil	Mag nie voorkom nie/Shall not occur	Soos vir Klas 1/As for Class 1
4. Ongespesifiseerde inwendige of uitwendige gehaltegebreke nie hierbo genoem nie/Unspecified internal or external quality defects not mentioned above	Geen/None	Soos vir Klas 1/As for Class 1

TABEL 2/TABLE 2

GROOTTEGROEPE VOLGENS MASSA/
SIZE GROUPS ACCORDING TO MASS

Groottegroep/Size Group	Massa/Mass
(a) Ekstra klein/Extra small	Minimum/Minimum 15 g Maksimum/Maximum 50 g
(b) Klein/Small	Minimum/Minimum 50 g Maksimum/Maximum 100 g
(c) Medium/Medium	Minimum/Minimum 100 g Maksimum/Maximum 170 g
(d) Groot Medium/Large Medium….	Minimum/Minimum 170 g Maksimum/Maximum 250 g
(e) Groot/Large	Minimum/Minimum 250 g Maksimum/Maximum 250 g+

TABEL 3/TABLE 3

TOELAATBARE AFWYKINGS VOLGENS MASSA/
PERMISSIBLE DEVIATIONS BY MASS

Gehaltefaktor/Quality factor	Klas 1/Class 1	Klas 2/Class 2
1	2	3
1. Bederf met inbegrip van koue- en hittebeskadiging: Met dien verstande dat geen van die aartappels in die res van die houer, of die houer self, nat of besmeer is deur bederfde knolle nie/ Decay including cold and heat damage: Provided that none of the remainder of the potatoes in the container or the container itself, is wet or soiled by decayed tubers	1%	Soos vir Klas 1/As for Class 1
2. Misvormd en Sandsplete/Malformed and Growth cracks	10%	15%
3. Aartappelmotbesmetting en aartappelmotbeskadiging: Indien 'n fitosanitêre vereiste ten opsigte van aartappelmot deur die invoerland neergelê is, word dit as 'n “verklaarde plant-skadelike organisme van fitosanitêre” belang beskou en onder item 8 hanteer/ Potato tuber moth infestation and potato tuber moth damage: If an importing country has stipulated phytosanitary	1%	1%
4. Uitwendige gehaltegebreke (uitgesonderd misvorming, aartappelmotbeskadiging en besmetting): naamlik bederf, vergroening, uitloopsels, meganiese beskadiging, nerfaf, gebreekte knolle, grond, insekbeskadiging, insekbesmetting, aalwurm, skilaalwurm en rhizoctonia, bruinskurf, stingelentverrotting, beskadiging deur ander plante, kouebeskadiging, hittebeskadiging en verleptheid: Met dien verstande dat bederf, kouebeskadiging en hittebeskadiging binne die perke hierbo gespesifiseer is/ External quality defects (with the exception of malformation, potato tuber moth infestation and damage) namely decay, greening, sprouts, mechanically damaged, abraded, broken tubers, soiled, insect damage, insect infestation, eelworm, skin eelworm and rhizoctonia, brown scab, stem-end rot, damage by other plants, cold damage, heat damage and wilt: Provided that decay, cold damage and heat damage is within the limits as specified above	5%	7%

5.	Inwendige gehaltegebreke (uitgesonderd bederf): naamlik bruinvlek, holhart, vaatbundelverbruining, waterigheid/Internal quality defects (excluding decay): namely brown fleck, hollow heart, vascular browning, watery	4%	6%
6.	Afwykings in items 3, 4 en 5 van hierdie tabel insluitend ongespesifiseerde gebreke gesamentlik: Met dien verstande dat sodanige afwykings individueel binne die perke soos hierbo gespesifiseer is/Deviations in items 3, 4 and 5 of this table including unspecified defects collectively: Provided that such deviations are individually within the limits as specified above	8%	12%
7.	Groottegroepafwykings/ Size group deviations:		
(1)	te klein/too small	10%	15%
(2)	te groot/too large	10%	15%
(3)	te klein en te groot gesamentlik/ too small and too large collectively	10%	15%
8.	Verklaarde plantskadelike organismes van fitosanitêre belang/Declared plant injurious organisms of phytosanitary importance	Soos bepaal deur die Hoofbestuurder van die Direktoraat: Plantgesondheid/ Landbouproduk-inspeksiedienste/As specified by the Senior Manager of the Directorate : Plant Health/Agricultural Product Inspection Services	Soos vir Klas 1/As for Class 1